

EP CONCEPT—the Best Electric Heli?

MODEL

48120

JUNE 1991

# AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

NEWS

**BIG NINJA!**  
Glope-Soaring  
Master

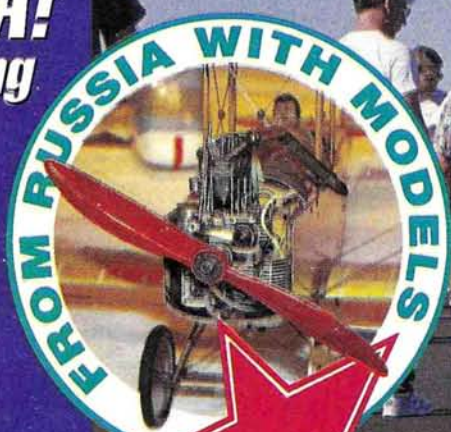
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# MODEL AIRPLANE NEWS

## FEATURES

- 36 Sig Ninja Sailplane**  
by David Garwood  
A Field & Bench Review  
—black belt of slope  
soarers
- 49 From Russia  
With Models**  
by Tom Atwood  
—Soviets visit  
WRAM Show
- 54 Du-Bro E/Z Fill  
Fuel Pump**  
by Joe Wagner  
A Bench Review  
—best yet?
- 60 2nd Annual  
Arizona Jet Rally**  
by Steve Gurley  
—bright colors, high  
speed!
- 69 Hobbico ASAP  
Extra 300**  
by Joe Lachowski  
A Field & Bench Review  
—ARF aerobat
- 74 Vacuum Bagging**  
by Bill Griggs  
—build better wings
- 78 Using Carbon Fiber,  
Part 1**  
by Greg Poppel  
—tips on installing  
carbon-fiber spars
- 81 R/C World's 7th  
Annual Fall Festival**  
by Wally Zober  
—Florida flying fun



**ON THE COVER:** top left inset—Kyosho's EP Concept electric heli. Top center: Sig Ninja flies the slopes off Cape Cod, MA. Clockwise from left: Steven Cantrell shows an F-86 Sabre at the AZ Jet Rally; Vladimir Bulatnikov's Air-1 biplane, which took Best of Show at the WRAM show (see "From Russia with Models"). Center: midday lineup of ducted fans at AZ Jet Rally; bottom: Dorian Anderson's colorful F-86 Sabre at the AZ Jet Rally.

- 97 Altech Sage 25  
Trainer**  
by Michael Smith  
A Field & Bench Review  
—almost-ready-to-  
cover trainer

- 94 Rotary-Wing  
Roundup**  
—latest products  
from heli  
manufacturers

## HELICOPTER SECTION

- 85 Contents**
- 86 Kyosho EP Concept**  
by Datu Ramel  
A Pad & Bench Review  
—the latest electric  
heli is evaluated
- 91 Helicopter Challenge**  
by Craig Hath  
Tips on stall turns

## CONSTRUCTION

- 29 Aquastar**  
by Laddie Mikulasko  
—build a .40- to  
.60-size seaplane

## COLUMNS

- 16 Air Scoop**  
by Chris Chianelli
- 19 Fifty Years Ago**  
by Gerry Yarrish

## COLUMNS

- 20 Quiet Flight**  
by John Lupperger
- 22 Sporty Scale  
Techniques**  
by Frank Tiano
- 42 Floating Around**  
by John Sullivan
- 46 How To: Make a  
Dihedral Support**  
by Randy Randolph
- 56 About Those Engines**  
by Joe Wagner
- 58 Small Steps**  
by Joe Wagner
- 103 Golden Age of  
Radio Control**  
by Hal deBolt

## DEPARTMENTS

- 6 Editorial**
- 8 Airwaves**
- 12 Hints & Kinks**  
by Jim Newman
- 24 Pilot Projects**
- 112 Plans Mart**
- 114 Product News**
- 116 Name That Plane**
- 118 Club of the Month**
- 122 Ad Index**



# EDITORIAL

by TOM ATWOOD

**J**UST BEFORE the turn of the century, someone seriously suggested that the Patent Office should be closed because all the important inventions had already been made! Anybody who thinks there's nothing new in R/C aeromodeling is just as mistaken as *that* person. At two recent industry shows, we saw a raft of exciting new products.

Held each February in White Plains, NY, by the Westchester Radio Aeromodelers, the WRAM Show isn't to be missed if you're within driving distance—it's the largest on the East Coast. Then, in early March, the LA



Editor Tom Atwood (on right) thanks Albert Nazarov, chief of the Central Sporting-Technical Modeling Club of the USSR, after an interview at the WRAM show.

Model Hobby Show made its third annual showing in Pomona, CA.

Which new products seen in these shows will we be covering? The surge in new warbird kits continues—both ARF and built-up; at least one major company introduced balsa sport kits for remarkably low prices; a new company is selling a modular, plastic-and-foam, wingeron controlled sloper (comes in its own carrying case); some beautiful, entry-level ducted-fan kits are here, or due to arrive soon; a new multi-battery, multi-output charger is on the block; and there are new, functional, four-blade props, dummy radial-engine facades, .15-size electric kits, and a muffled tuned pipe for ducted fans. Several new engines were shown—from radial to diesel to new foreign imports. The list goes on and on!

At the WRAM show, we were fortunate enough to connect up with the Soviet modelers who had been invited to put on an exhibition there. Seeing their award-winning models and making the acquaintance of the friendly Soviet modelers was a particular treat. (See "From Russia With Models" in this issue.)

I'm pleased that the new R/C unlimited races (minimum wingspan of 100 inches; free choice of engines; \$25,000 in prize money) that are scheduled for later this year now have a date and a site. Tom Easterday reports that the races will be held on October 3 through 6 at the Madera Municipal Airport in Madera, CA. For more information on what promises to be one of the biggest R/C competitions of the year, contact R/C Unlimited Racing, Inc., 565 Mercury Lane, Brea, CA 92621; (714) 255-0747. If you're building for this event and plan to fly in it, and you'd like to share news of your efforts with other readers, let me know.

We're all delighted that Operation Desert Storm has been brought to a successful conclusion, and we hope that the troops who received the copies of *Model Airplane News* we sent will *all* soon be reading them on the trip home.

## MODEL AIRPLANE NEWS

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# AIRWAVES

## WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves," *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

## FOUND FOX

I recently received the first issue of my new subscription to *Model Airplane News*; I intend to get back into the hobby of building and flying model planes—after many years of inactivity. On page 10, in "Airwaves," a letter describes a "mystery engine," giving dimensions and a photograph. This engine is a Fox .09. I still have the one I bought new in 1959 for \$4.95. I've attached a copy

of the instruction manual, with a detailed parts price list. Do you suppose Fox would still honor its claim that no repair on this engine would cost more than \$3?

I'd appreciate your relaying this information and the instruction manual to Harry R. Dubray in Aberdeen, SD. I hope he has as much pleasure with his Fox .09 as I've had with mine. I look forward to receiving future issues. Happy flying!

DON MUNROE  
Kirkwood, MO

*Don, yours was one of eight letters identifying the engine. Four readers guessed it was an .09, and Fox confirmed that it was introduced in the late '50s. Other readers got the manufacturer right, but guesses at displacement varied from .07 to .10. Ron Withington of Lake Worth, FL, even sent a photocopy of an ad for the engine from the January '60 MAN. We've sent all correspondence to Harry Dubray.*

TA

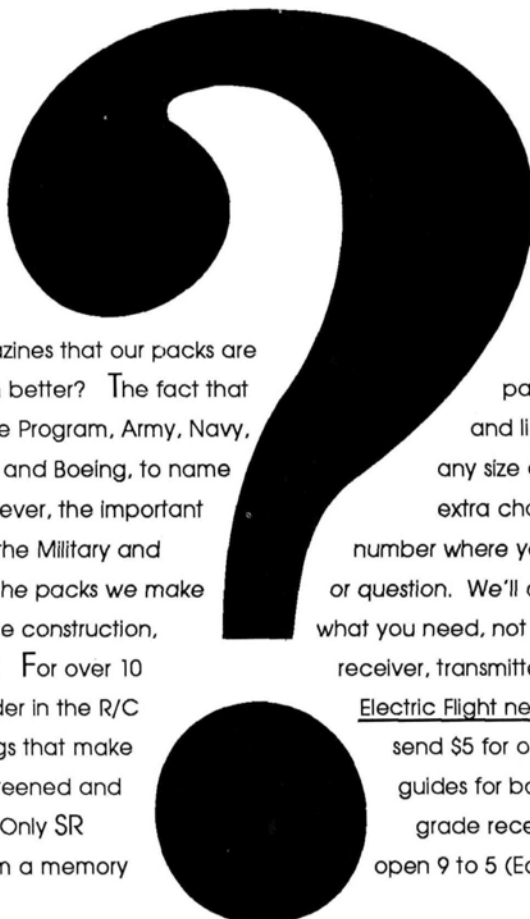


## BUILDING OVER GLASS

I'm a subscriber, but during the past six years, I've been assigned to my company's Tokyo office and haven't been active in the hobby. Frank Tiano's "Sporty Scale" column in the March '91 issue is of particular interest to me. I

Why should you buy an SR battery pack? That's a great question!

Usually, when people call us for the first time, they want to know if our packs are really worth the \$5 or \$6 more than the price of an ordinary pack. They've heard from friends and read in all the R/C magazines that our packs are the best but what really makes them better? The fact that we make packs for the Space Shuttle Program, Army, Navy, Marines, Air Force, NASA, Lockheed, and Boeing, to name a few, might sound impressive. However, the important thing is that the packs we make for the Military and Aerospace Industry are identical to the packs we make for you! We use the same cells, same construction, same testing, and the same people! For over 10 years SR Batteries has been the leader in the R/C field. Here are just a few of the things that make an SR pack better: Only SR uses screened and matched Aerospace grade cells... Only SR guarantees every pack to never form a memory



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will return to the U.S. this summer, and I'm looking forward to setting up a workshop again. During my absence from the hobby, a lot of changes have taken place, including the use of plate glass as a building surface. Can you refer me to an issue in which this was described, or give me some of the essentials of this technique? I'm guessing that this method uses some of the new adhesives to hold the plans on the glass, to hold the waxed paper on the plans, and then the wood to the waxed paper. If so, what kinds of adhesive are used?

CHUCK DAGGS  
Tokyo, Japan

*Chuck, Frank Tiano touched on this building technique in the January '90 "Sporty Scale" column (see photo). Basically, 1/4-inch-thick glass is used as a flat, inflexible building board onto which you tack-glue the model you're building. Use any of the available brands of cyanoacrylate (CA) glue sold in hobby shops. They come in thin, medium and thick viscosities, and there are sprays that make the CA set almost instantly. Experiment to find the combination you prefer for building on glass.*

*Using a grease pencil, draw a straight reference line on the glass and put your model pieces on top of*

*it. Glue balsa sticks to the formers and to the glass, while taking care to ensure that the pieces are perpendicular to the glass and correctly aligned. When the model has been planked or sheeted so that it's stiff, simply prize it off the glass with a long, thin modeling knife, and then finish building.*

*To make wings, tack-glue the bottom spar to your reference line, and continue as before. You can put the plans on top of or under the glass, but first spray the glass lightly with a contact adhesive, such as 3M 77, so that the plans don't move. If you put the plans on top, cover them with wax paper and then cut 1-inch squares out of the plans*

*and the wax paper so the bottom spar can be tack-glued directly to the glass. In all cases, the glass gives you an absolutely flat surface on which to build and with which to align your tail surfaces. Good luck. I hope this straightens it out for you.*

GY

### AEROMODELING CLASS?

Could your company donate posters or other materials that I could use in my classroom as motivational aids. I'd use them to show where technology and its applications are headed for in the transportation field. I

(Continued on page 10)

# FALCON FEVER?

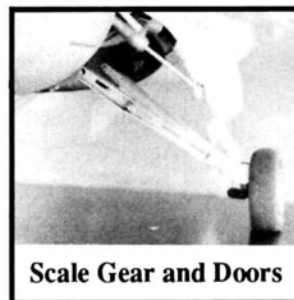
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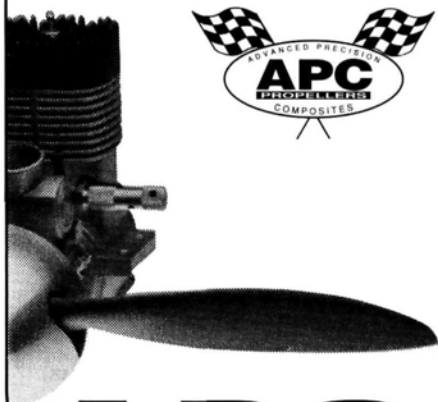


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7.8x4, 7.8x6, 7.8x7, 9x6.5, 9x7.5, 9x8.5 ..... **\$3.95 EACH**

11x10, 11x11, 11x12, 11x12W, 11x13, 11x14, 12x9, 12x9W, 12x10, 12x10W, 12x11, 12x11N, 12x12, 12x12N, 12x13, 12x13N, 12x14, 12.5x9, 12.5x10, 12.5x11, 12.5x12, 13x9, 13x10 . **\$7.95 EACH**

13.5x9\*, 13.5x12.5, 13.5x14, 14x6\*, 14x8, 14x10, 14x12, 14x13\*, 14x14, 14.4x10.5, 14.4x12, 14.4x13\*, 15x8, 15x10, 15x12, 16x8, 16x10, 16x12 ... **\$12.95 EACH**

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# AIRWAVES

want to display that concept and, at the same time, instill pride and good work habits in the students.

Would there be any possibility of your donating one of your products for lecture/problem-solving activities?

GREG SMOTHERS  
Jefferson City, MO

*Greg, we support bringing images of aviation transportation into the classroom, but why stop there? We'd like to see aeromodeling brought into the classroom as a legitimate course of study. It could be an alternative to shop classes (e.g., metal shop, electronics, wood shop). It involves a variety of construction techniques and a knowledge of mathematics and engineering, and, as we all know, it's a heck of a lot of fun. Instead of taking home a bookend, a sheet-metal box, a plumb bob, or a buzzer, students would make models that they could fly. We'll send posters, some basic "how to" books on aeromodeling, and back issues for your use.*

*Are there any high school teachers out there currently teaching aeromodeling for credit? We'd like to hear from you.*

TA

## DESERT DAYDREAMER

I'm sitting in the sand of Saudi Arabia in Operation Desert Storm, but my mind is on R/C. I'm building a Dynafite F6F Hellcat. Owing to situations beyond my control, I had to take a leave of absence from my project, but I'm still considering a problem that you can probably solve.

The Hellcat will be powered by a K&B .61. I'd like to put a three-blade prop on it for that realistic look we all love. Is there a simple conversion from two blades to three? The .61 would usually take an 11x7. What size of three-blade prop would be best?

PERCY PARKER  
Desert Storm, Iraq

*Lieutenant Parker, I hope this letter doesn't get you into hot water with your CO—maybe he's dreaming of R/C also. Hobby Lobby International carries all the Graupner glass-filled nylon props, including the three-blade ones. There are two three-blade props suitable for 2-stroke .61 engines: a 10x8.3 and a 10x7. Considering that the model has higher drag and a large radial cowl, and that the K&B .61 has conventional loop-scavenging, the 10x7 is the one for you.*

*As a general rule, when moving from a two-blade to a three-blade prop, you should go down in diameter by 1 inch. When you select a prop, you should match it to the airframe, not just to the engine. Sleekness of design comes into the picture; for optimum speed, a high-drag biplane with struts and wires will take a finer pitch and greater diameter, while a "clean" racer will need coarser pitch and often a smaller diameter. Hobby Lobby's catalogue shows an extensive line of two- and three-blade props, including pushers, and they're listed with their recommended use. I find this chart very helpful. If you want to order a prop or a catalogue, Hobby Lobby's address is 5614 Franklin Pike Cr., Brentwood, TN 37027.*

CC

## SURPRISE SWEEPSTAKES WIN

Thank you for choosing me as the winner in your "Sky-High" sweepstakes. I'm 13 years old, and I've been saving my money for a long time to buy an R/C helicopter. Now I can get everything I need to get started in my new hobby. Thanks to you and your magazine; you've made it possible for me to be flying with other R/C modelers. I'm looking for a model club in my area, and I'll let



you know how my exciting prizes and I are doing very soon.

MICHAEL HONSE  
Godley, TX

*You're welcome, Michael, and good luck with the hobby! [Our initial selection for Grand Prize winner in the Sky-High Sweepstakes declined his prize of \$3,000 in hobby merchandise—will wonders never cease? Michael was the first chosen alternate].TA*

### FROM ROMANIA WITH FLAPS

You'll possibly be a little astonished to get this letter from Romania. I'm a lifelong aviation enthusiast and historian, a pilot flying the AN-24 short-hauler and, most recently, the associate editor of a new publication, *Flaps-Up* aerospace periodical. Our magazine faces many difficulties because we're practically lacking in currency and good printing machines; if you have any advice, please don't hesitate to tell it.

We'd like back issues of *MAN*, and we're looking for contacts/collaboration/assistance from everyone with any interest in Romania's aeronautics.

DORU VARLAN  
P.O. Box 18-115

Oficiul postal 18, Sectorul 1  
71500 BUCHAREST  
ROMANIA

*Doru, we wish you and Flaps-Up success. The back issues are in the mail.* TA

(Continued on page 73)

We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

# The Second Great R/C



# Design Contest

**—Your chance to become a famous modeler!**

*The best five designs will be featured in Model Airplane News as construction articles, and all will be considered for publication.*

1st Place—\$1,200    4th Place—\$500  
2nd Place—\$900    5th Place—\$250  
3rd Place—\$750

### How to enter:

Submit several clear photographs of your model (include flight shots, if possible) by AUGUST 1, 1991. Only models that have never been published or manufactured are eligible, but there is no restriction on type of R/C plane.

### Who will choose the winners?

The *MAN* editors—with your input! Later in 1991, we'll publish photographs of the models, and you'll send us a postcard indicating your favorite.

### Announcing the winners:

*Model Airplane News* will feature an article giving details of the five winners, and each one will be the subject of a feature construction article.

### Be prepared!

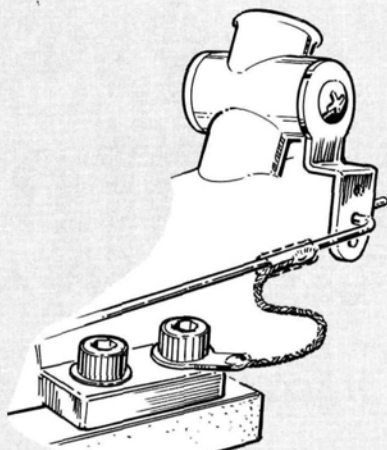
Winners must be prepared to submit a complete construction article (6 to 8 typed, double-spaced pages; formatted on disc is preferred), good black-and-white photographs of the building sequence, full-size construction plans and color slides of the model, both on the ground and airborne. Before announcing the winners, the publisher must receive proof that plans, photographs and articles are available for the five chosen designs.



# HINTS & KINKS

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

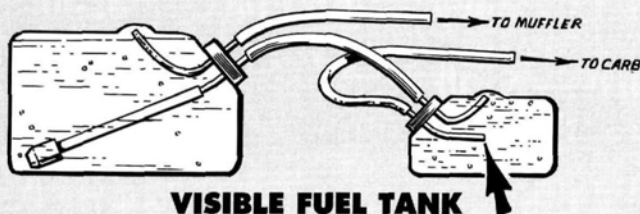
by JIM NEWMAN



## CURE RF NOISE

Do space limitations force you to use a metal pushrod connection to the throttle arm? Here's a way to prevent the radio interference that's caused when the metal parts touch. Electrically connect the pushrod to the engine by soldering flexible copper braid to the pushrod and to a tab that can be clamped under an engine-mounting screw. To protect the movable joint, cover it with a piece of shrink-wrap as shown.

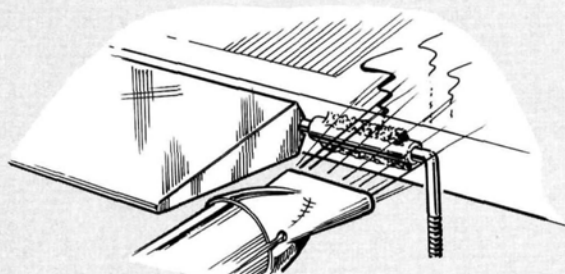
Herman J. Grooters, Hudsonville, MI



## VISIBLE FUEL TANK

In many helicopters, the tank is positioned so that it's hard to see, even when the heli hovers close-in. Mount a smaller tank in series, but position it where you can see it. Make sure that the "arrowed" pipe is in the center of the tank so that fuel can be picked up when the heli is in any position.

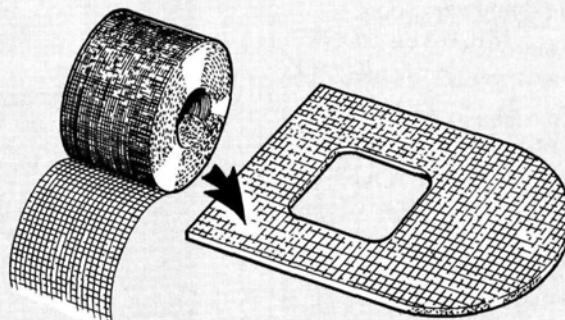
Arthur E. Stanley Jr., Warminster, PA



## STRIP-AILERON BUSHING REMOVAL

To remove strip ailerons for repairs, you can cut apart the hinges and re-hinge after recovering, but what about removing epoxied torque-rod bushings? Here's an easy way: Using a heat gun, heat the epoxy until it crumbles.

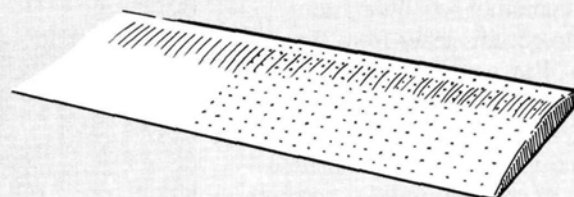
Robert S. Hoff, Bethesda, MD



## GLASS-REINFORCED BALSA

The 2-inch-wide fiberglass mesh that's used for taping sheet rock is perfect for reinforcing formers. It comes in 300-foot rolls, and it has adhesive on one side. To stiffen the formers, apply this mesh and two coats of Balsarite to both sides. This reinforcing method is ideal for rear fuselage formers; to save weight, you can cut out the centers.

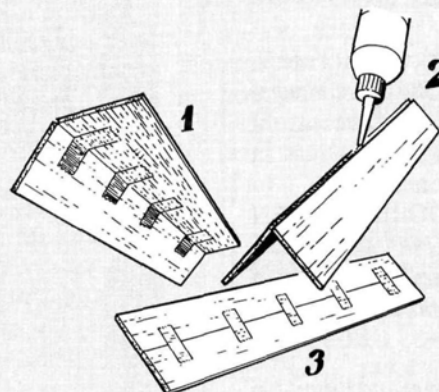
Mike E. Abanshin, Lynnwood, WA



## REMOVE ROTOR-BLADE BLISTERS

If the adhesive covering on the tips of your helicopter's rotor blades blisters, try this. Iron the covering down firmly again, and then, using a pin, perforate the blistered areas. Wick thin CA into the holes, wipe off the excess, and smooth the covering. This causes a little discoloration, but it eliminates the vibrations and noise that blistered covering causes.

Tim Peters, Jennings, KS



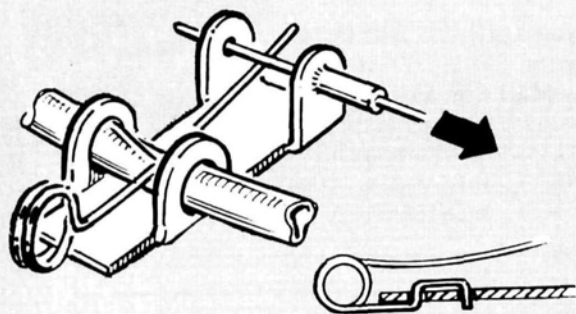
## JOIN BALSA SHEETS

Here's an easy way to join balsa sheets. Use a metal straightedge and a sharp blade to trim the edges straight. Keep the blade vertical. 1: Stretch pieces of tape tightly across the backs of the sheets to "hinge" them together. 2: Fold the sheets into an inverted "vee," and run a thin bead of white glue along the joint. 3: Press the sheets down flat to close the joint, and stretch pieces of tape over the upper surface. Weight the sheets down until the glue has dried, and then lightly sand the joint.

Michael Rector, Orland Park, IL

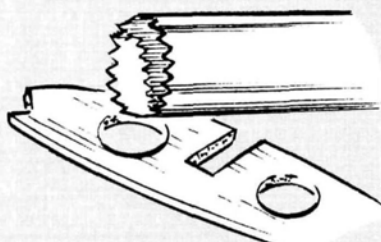


## HINTS & KINKS



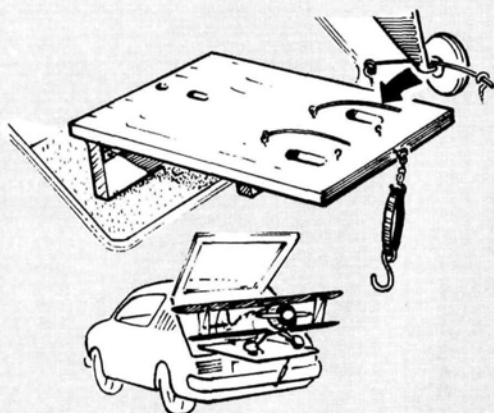
### RELEASABLE WATER BALLAST

This releasable water ballast is great for scale sailplanes. Make a dump valve out of brass or tin plate, and solder a tube bushing onto it. Seal the rubber surgical tubing with a wire spring. The servo retracts the pin, the spring is released, and a water-filled balloon is dumped.



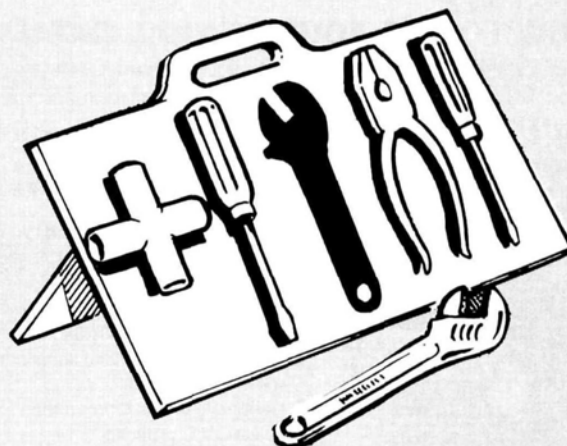
### HOLE SAW

This neat "hole" saw cleanly cuts holes in balsa. File teeth into the sharpened edge of a piece of metal tube. To cut holes, simply rotate the tube as you press it firmly down on the wood.



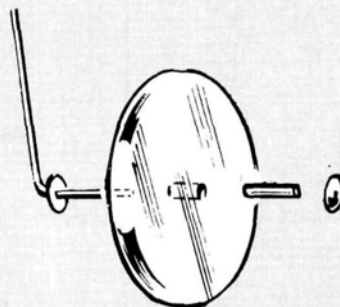
### TRAVEL RACK

Having to disassemble a plane to fit it into the back of a small car is a pain. This board safely holds a model in a vehicle's open hatch at speeds of up to 45mph! Snap wire clips over the axles, and sit the wheels into the slots in the board. Rubber bands cut from inner tubes and S-hooks are used to anchor the board to the rear bumper. This device can be folded and hung up in your workshop or garage. Be sure that the hatch isn't blown shut at high speeds.



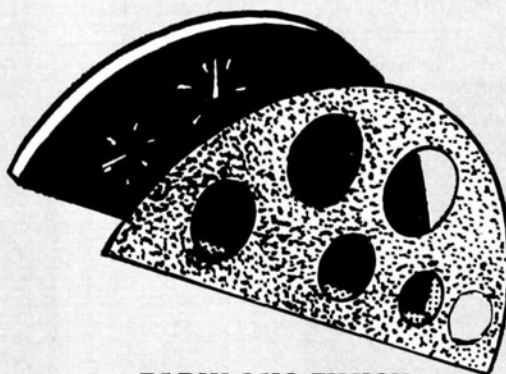
### FAIL-SAFE TOOL CADDY

A tool caddy with painted silhouettes reminds you that a tool is about to be left behind. This board can stand as shown, or it can be used as a pull-out shelf in your flight box.



### "INVISIBLE" RETRACTS

The wheels on these retracts are of Plexiglas, so they're difficult to see in the air. You can use them on pylon racers, too.



### FABULOUS FINISH

Black, 600-grit, wet-or-dry sandpaper looks just like the wrinkled finish on full-size instrument panels, and it also can be used to make very convincing scale-wing walkways.

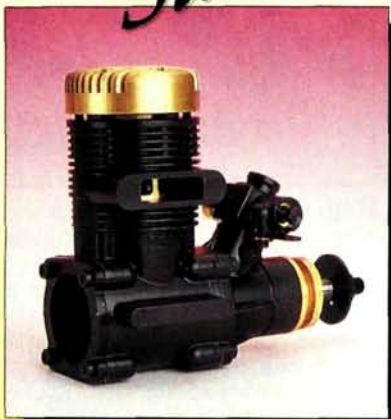


# AIR SCOOP

by CHRIS CHIANELLI

*New products or people behind the scenes—my sources have been put on alert to get the scoop! In this column, you'll find news that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares?—it's you, the reader, who matters most! I spy for those who fly!*

## Black Silk comes back



Back in the early to mid-'70s, my favorite 2-stroke engine was always the Austrian HP—not because it was more powerful than others, but because it ran smoothly with incredibly little vibration throughout the rpm range. How they got a single-cylinder

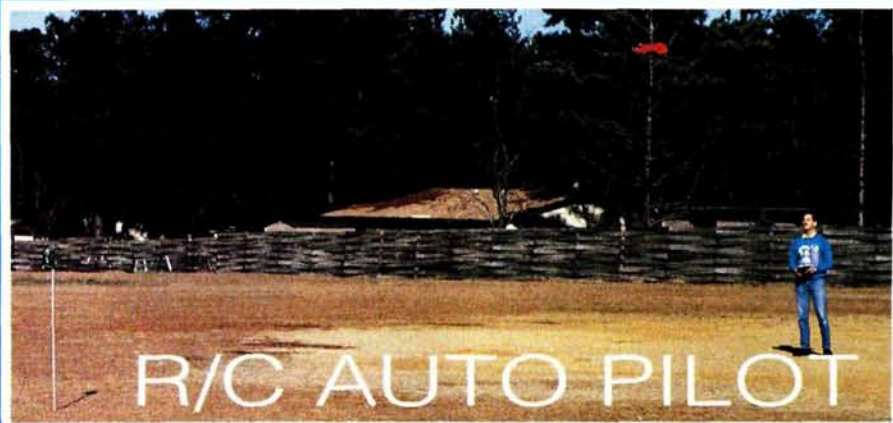
engine to operate so smoothly from idle to full bore never ceased to impress me. When Hirttenberger, manufacturer of the HP, closed its model engine department, I wasn't pleased! Well, "Mr. RJ," of RJL Industries (maker of the fine RJL .61) has now come to the rescue by purchasing all Hirttenberger's remaining stock and tooling, and the HP will be less expensive than Japanese imports. Other HP engines, including some of the 4-strokes, will also be available. For more information, contact: RJL Industries, P.O. Box 5, Sierra Madre, CA 91025, or call (818) 359-0016. Anybody out there have an old "4-bolt head" HP .61 to sell?—contact me.

## FREE FALLING



How would you like to be this guy? His name is Victor, and he's the first (I think) powered "parasailer." Just attach a .21 to .25 2-stroke or a .40 4-stroke to his back, and off he goes. Victor isn't yet available in the States, but if you're interested, you can fax his producer, Power Victor, in Germany (49-4163-5951). I don't know, Victor looks slightly frightened to me!

Would you believe R/C control line? Well, it's here! Invented by Paul Savicki, this R/C control-line device sounds like a contradiction, but it's a patented invention that may have real training value. Paul wanted to introduce his seven-year-old son, David, to R/C, one step at a time, and the R/C Auto Pilot did the trick. Any advantages?—no dizziness; single-operator control; inexpensive; easy to train new pilots; can be used with any control-line



model without modification. If there are any interested manufacturers out there, contact Paul Savicki, Rt. 1, Box 885, Linwood, NC 27299, or call (704) 956-6002.





## PRETTY...and almost ready



I saw this new Thunder Tiger ARF pattern ship at the Nuremberg show. The Champion-45L will feature a built-up balsa fuselage and a sheeted-foam wing. The model is covered and ready

for the final assembly steps. All extras like tank, spinner, wheels and other hardware are included. There's no set date when this pretty pattern ship will be available in the States; but I hope it's soon. I'll keep you posted.

Weston UK, isn't yet known in the U.S., but it should be! The company claims some amazing qualities for its new line of mufflers, and reports from others overseas seem

## Silent UK

to support their boasts. The Viper System 90 aircraft, helicopter and low-rpm mufflers are reputed to reduce noise by as much as 4.8dB—with increased rpm!

Alan Greenfield of Weston

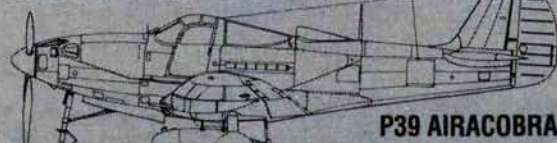
UK says "These are, without question, the most powerful and quietest units that can be fitted to a Concept/Space Baron, regardless of the engine used. The forward-facing muffler gives an additional 2,500rpm, but with significantly less



noise!" I wish one of the distributors out there would bring these things into the U.S. so we can find out for ourselves.

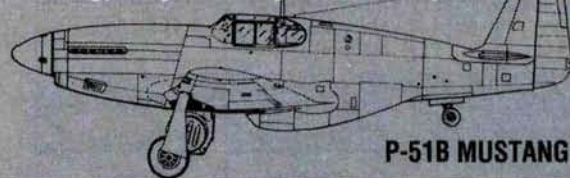


Just when it seemed that other manufacturers of ready-to-fly WW II planes were making progress, the father-and-son Takamatsu EZ team has blown everyone's mind. They aren't the first to come out with a venerable Curtiss P-40, but



P39 AIRACOBRA

they'll follow it with a P-51B and a P-39 Airacobra. No wonder these guys are always smiling; they're always full of surprises.



P-51B MUSTANG



# FIFTY YEARS AGO

## CONTESTS, CONSTRUCTIONS AND A NICKEL'S CHANGE

by GERRY YARRISH



**J**UNE 1941. Shoe shines are 5 cents, and you get a nickel's change from your quarter for a copy of *Model Airplane News*. In this, the twelfth year of publication for *MAN*, the mood of the war in Europe is reflected in all the cover art of Jo Kotula, and the June '41 cover is no exception. A black-blue, star-filled night sky silhouettes the "Berlin Buster"—the name *MAN* gave the Handley-Page Hampden.

Heralded as the most remarkable war machine ever designed, it was truly an all-purpose combat plane. The design married the best bomber load-carrying capabilities with the speed and death-dealing characteristics of the most advanced fighter planes of the time. Introduced in late 1936, the plane's flight performance wasn't the only remarkable thing that the design had to offer.

Its construction was also a marked advance in aviation technology. The airframe was an all-metal design with no fabric covering, and the major components were assembled with new pan-head rivets. When "bucked" into position, the rivet had what was then the closest thing to a flush finish. The airframe was also built in sub-assemblies, and no major jigs were required to build the bomber. It had a wingspan of 69 feet, 2 inches; a length of 53 feet, 7 inches; and an empty weight of 11,780 pounds. With its twin 956hp Bristol Pegasus 9-cylinder radial engines, it had a top speed of 265mph. Though tame by today's standards, there were over 1,000 Hampdens then in service, and the design had a dramatic role in the defense of Great Britain.

### EAST COAST CHAMPIONSHIP

**T**he model flying season was in full swing, and the 7th Annual Eastern States



*The Hadley Model Club members with their Class "A" gas jobs at the Eastern States Championship Gas Contest.*

Championship Gas Contest was covered. The event was held at Hadley Field, NJ, and it was sponsored by the Kresge Aero Club and *MAN*. It had events for Class A,

B and C planes and a special controlled-flight event. This was for R/C models and models with mechanical devices, such as timers that provided predetermined flight performance. Prizes ran over the \$1,000 mark, and the contest was fully sanctioned by the AMA.

### RUBBER-POWERED FIGHTER

**T**he June issue had a construction article with full-size plans for a nice-looking P-39 Airacobra. The wingspan was 21½ inches, and it was 19 inches long. The model was built in the traditional stick-and-tissue fashion with the fuselage built in halves over the plans. Formers, keel, planking and ribs were of 1/16-inch balsa sheet, and the stringers were 1/16-inch-square stock. The propeller was hand carved, of course, and the covering

was tissue tightened with a light spray of water. Eight to 10 strands of brown rubber were suggested for power, and the use of lubricant was advised. The flight performance was said to be very good, and builders were sur-

prised at the distances this model would cover. Looking at rubber-powered models today, it seems very little has changed in construction techniques.



*The stick-and-tissue P-39 Airacobra. Little has changed in rubber-powered model construction.*

### FOKKER D-8 "GASSER"

**A**nother construction article was one on a scale model of the Fokker D-8—the "Flying Razor" from the German Imperial Air Force. The model (a free flight), had a wingspan of 57 inches and weighed 28 ounces. Power came from an inverted Ohlsson .23 swinging a 12-inch propeller. Looking much like a scaled-up rubber-powered model, the D-8 plans were printed one third of full scale, and the modeler needed draftsman dividers to scale-up the drawings. For flying, the model was set up for 20-second engine runs, and its first flight started with an unassisted ROG and lasted 1½ minutes. Under power, the model climbed and circled to the left, and then after the engine signed off, it would glide in a flat descent to the right. With a little trimming, the model could actually catch thermals and have extended flight. With its high-parasol-wing format, this model was very easy to build, fly and trim.

Fifty years ago, the models, magazines and the world in general were very different. I wonder what will be written about our times in the year 2041. ■



# QUIET FLIGHT

## EXPLORER'S FINAL COUNTDOWN

by JOHN LUPPERGER

**C**OMPUTERS ARE wonderful, and I'd be lost without mine. I use it for my plans-service income records; for my magazine, kit and album inventories; for airfoil plotting; and for

puters, and the computers generated the same specs.

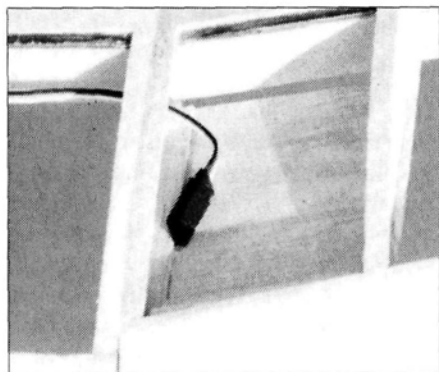
Because of the Reynolds numbers that we use, most of us wouldn't notice the difference between high-performance ships and those with a little character. I still remember how much fun I had flying my Bird of Time

adding spoilers.

First, in all but two of the center-section ribs, drill a  $\frac{3}{16}$ -inch hole  $\frac{1}{2}$  inch behind the spar notch. (For the best results, stack the ribs when you drill them.) In six of the center-section ribs, drill a  $\frac{1}{8}$ -inch hole  $2\frac{1}{2}$  inches back from the

in it) into two halves (front and rear). Because the center section is built without dihedral, glue the root rib's rear half into place at 90 degrees to the building surface. To allow room for the wing hold-down dowel, glue the root rib's front half  $\frac{1}{8}$  inch from the edge of the leading-edge sheeting. (Be sure to completely encase the dowel in epoxy when you glue it into place; this area is subjected to a lot of stress during hard "zoom" launches.) The next three ribs will be those with the  $\frac{1}{8}$ -inch holes in them, and the remaining ones will only have the  $\frac{3}{16}$ -inch holes. When they've been glued into place, trim the shear webs to fit exactly between the ribs for the entire span of the center section.

Except for the top sheeting, finish building both of the panels according to the instructions. To make the center joiner, cut a straight piece of  $\frac{3}{32}$ -inch-thick, five-ply plywood that's  $1\frac{13}{16}$  inches wide and  $9\frac{7}{8}$  inches long. Cut a  $\frac{3}{32}$ -inch slot in the first two ribs of both panels directly behind the spars and shear webs. Generously coat the first two webs, the edges of the spars and the two adjoining root-rib surfaces with 30-minute epoxy. Join the two panels with the  $\frac{3}{32}$ -inch ply joiner so that it touches the top and bottom spars and the shear webs of the first two bays. Clamp this assembly together until the epoxy has cured.



*Here you can see the tip panel's first bay and the balsa-sheeting plate to which the aileron servo will be mounted. Mount the servo with thin servo tape, and cut a slot through which the servo arm can protrude below the wing's surface.*



*You can build the spoilers in the same way as those on any built-up wing. The spoiler blade is made of a firm piece of balsa trailing-edge stock.*

PHOTOS BY JOHN LUPPERGER

writing articles. Too much dependence on what computers spit out isn't good, though. I like high-performance gliders as much as the next guy, but I'm tired of all the look-alike performance ships. Have you noticed that the latest "whiz-bang" model from one side of the country looks just like the latest one from the other side of the country? Did the two designers confer about the wings' shape, the airfoils, the fuselages' shape and length and the projected areas? *No!* They fed high-performance glider parameters into their com-

and how long it stayed up. I don't advocate the end of high-performance models; I just don't think there's anything wrong with simple good-looking models that are a pleasure to fly. If we become too technical, we'll lose sight of the fun our hobby has to offer!

### PROJECT EXPLORER 2M

**T**his month, I'll finish the Project Explorer by discussing how to build the wing's center section. The modifications will include replacing the shear webs, eliminating the dihedral and

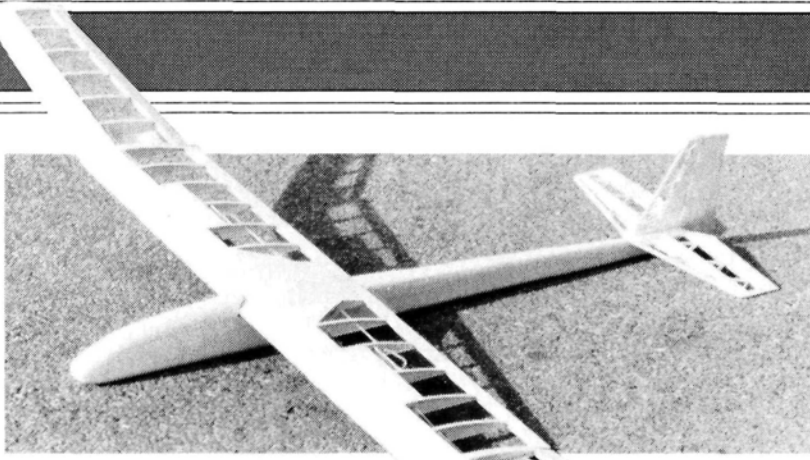
spar notch, and then start to build the center-section frame according to the instructions. Pin the bottom leading and trailing-edge sheeting down, and glue the bottom spar to the leading-edge sheeting. Glue the bottom center-section sheeting and the capstrips into place. From  $\frac{3}{8}$ -inch, vertical-grain balsa sheeting, cut new shear webs for the entire center section. This section will be "I-beam sheared" with shear webs that are the same width as the spars.

At the spar notch, cut the root rib (a rib without holes



Next, run the spoiler-line tubing through the  $\frac{1}{8}$ -inch holes in the first three ribs. Drill an angled hole through the center of the bottom sheeting (very close to the center rib) just behind the spar. Run the tubing through this hole, glue it securely into place, and then cut it so that it's flush with the bottom of the sheeting. Glue a scrap piece of  $\frac{1}{16}$ -inch sheeting between the ribs in the fourth rib bay on which to anchor the tubing's other end. Build the spoiler bay in the same way as those on the Project Wanderer and Sophisticated Lady (it should only be two bays wide and  $\frac{3}{4}$  inch long). If you don't have the articles, you can use the instructions from any built-up wooden kit that has spoilers.

To accommodate the aileron extension wires, drill two small holes directly behind the spoiler-tube exits in the center sheeting. Cut a  $\frac{3}{32}$ -inch slot in each center-section end rib directly behind the spars and the shear web. Coat the shear web, the spar edges, the center section's last rib and the tip panel's first rib with 30-minute epoxy. Join the two sections, and clamp them together until the epoxy has cured. Using the hole in the last center-section rib as a guide, make a hole in the tip panel's first rib. String the aileron exten-



*Completely framed and ready for covering, the Project Explorer 2M still looks like the original, but it's even better equipped for the rigors of contest flying.*

sion through the  $\frac{3}{16}$ -inch holes in the ribs and out through the center sheeting. (Remove the pins from the connector and reinsert them after you've strung the extension through ribs and sheeting.)

Finish sheeting the center section's top and add the capstrips. Finally, make a place for the aileron servo by attaching a piece of firm  $\frac{1}{16}$ -inch

most adverse conditions. Use a sturdy tow hook when you launch the Explorer; it's capable of powerful launches that will straighten most standard hooks.

Several people have requested that the next project plane be electric. I'll look around and make a decision in the next few months. I'm thinking along the lines of a sloper that can be converted for sport aerobatics, or possibly a "wet"-power model that can be converted to "quiet flight."

## FIELD QUICK CHARGER

One of the worst things at the flying field is hearing a shout of, "I don't have it." The second worst is discovering that a plane

crashed because its batteries were low on power. It's equally disappointing when a friend invites you to go flying on the spur of the moment, and you don't have anything on charge. Now you can eliminate these problems with a KO Propo\* BX-201 Automatic Field Charger.

This compact field charger ( $5\frac{1}{2} \times 1\frac{1}{2} \times 4$

inches) is one of the nicest I've ever seen, and it comes in a high-tech, brushed-aluminum case. Its power source (any 12V battery) hookups are large chrome clamps, and its output connectors for battery hook-up are what I'd call the "stereo" bare-wire type.

You push down on a plastic spring-loaded tab to expose a metal plate. This plate has a hole in it through which you insert the bare wire, and when you release the tab, the wire is held firmly in place.

The BX-201 comes with a transmitter charging cord for Futaba, Cirrus, Airtronics and JR transmitters. (Charging cords for the airborne side aren't supplied.) It peak-charges 250mAh to 1800mAh batteries at a 1.2A (non-adjustable) fast rate and then switches to a 42mAh trickle. It has a "select" switch, so you can charge either receiver batteries or transmitter batteries (it can't do both at the same time). It charges most 250mAh to 500mAh airborne packs in 20 to 30 minutes, and 500mAh to 700mAh transmitter packs in 30 to 45 minutes (if the packs are almost dead).

During long flying sessions, I use the BX-210 to charge my receiver batteries between flights, and I charge those for my transmitter later. Between rounds at contests, I put my batteries on trickle to ensure they'll be at full power in each round. The unit is also popular with other competitors who want to make sure their batteries are up to par.

My BX-201 is just as im-

*(Continued on page 66)*



*The KO Propo BX-201 peak-detector field charger could help you avoid losing a model. This unit fast charges most radio batteries in about 30 minutes.*

sheeting to the tip panel's first bay. You can mount the servo with servo tape and cover it when you finish the wing. If you ever need access to the servo, it's easy to cut away the covering on the top of the wing.

With all of these modifications, this model should be able to compete with the best in all but the



# SPORTY SCALE

## TECHNIQUES

by FRANK TIANO

### Jets Over Deland

**G**OOD AFTERNOON, scale fans, and welcome to the beginning of the 1991 flying season. By now, most of you have dug out of winter and are probably flying off your rain-soaked, muddy field—much to the dismay of your bride who just doesn't understand how so much mud could adhere to so little shoe and decide to disembark at the very minute you walk across the living room floor! Chianelli's Law!

I had the pleasure of attending one of the most in-

▶ *Bob Fiorenze's Jet Model Products Phantom moments before touchdown at Deland. The model is six years old and is flown regularly, both for sport and for demonstrations.*

▼ *Fio's Phantom on a flyby. In this photo, it's really hard to tell it from the real thing. This big jet uses two O.S. .91s for power.*



alistic maneuvers.

By the way, Bob is an advocate of painting scale model jets in a manner that deviates from scale but affords better visibility. The Violett crew has been doing this for years now, even though this practice prohibits

entering a scale contest. For sport flying, however, I totally agree that you can get some slick-looking paint schemes from the depths of your imagination, and they will appear "real" to all but the most knowledgeable of modelers.

Jerry Caudle of Metropolis, IL, gave everyone a good look at his new Violett F-86 done in a sport-scale scheme. Jerry calls the bird a "Sport Sabre," and he finished it in a pleasing-to-the-eye, yet very visible, color scheme of a soft yellow and white with a dark blue trim. Patti Violett (Bob's daughter) put on one of the best flight demos of the entire weekend. She displayed one of the new '86s done up in the colors of the newest precision-flying

teresting ducted-fan events of 1991, only a mere 4-hour drive from my home. This yearly "Jets over Deland" get-together is really gathering momentum and promises to be one of the premier jet events in the country—once they get some of the wrinkles worked out.

Deland, FL, is approximately 25 miles west of Daytona Beach and maybe 35 miles north of Orlando. The site has an abandoned full-scale runway, which makes one of the largest model

runways you've ever seen. Pilots from all over the East and Midwest converged on Deland on the second weekend in February and registered almost 100 aircraft. True, most were non-scale, but the event was breathtaking nevertheless.

Scale jets were represented by Byron, Yellow Aircraft, Jet Model Products and, of course, Bob Violett Models. Bob Fiorenze, who represents Yellow Aircraft, put on several flight demonstrations with a nice single-engine F-4 but, frankly, his larger, more powerful, twin-engine, Jet Model Products F-4 (designed by Tom Cook years ago) still packs more "wow" and awed spectators and pilots alike with its steady performance and re-



*Frank Tiano's B.V.M. Aggressor painted in pseudo Navy color scheme. Hobbypoxy paint was used straight from the can. Orange stripes outlined in white and an all-white bottom help visibility tremendously.*



team (appropriately named the "Sabre Jets")—once again, a very neat, non-scale color scheme on a true scale model. If this idea had been presented to me years ago, I might have balked at it, but seeing it represented in a professional manner has certainly changed my mind. If you have absolutely no intentions of competing, why not paint your model in any way you like? Just keep it believable!

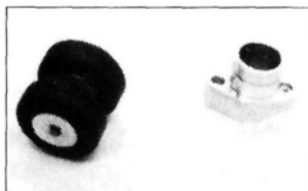
Back to Bobby Fiorenze: besides his affiliation with Yellow Aircraft, he also owns and operates Fiorenze Hobby Center in Winter Springs, FL. Along with your normal everyday items, Bob stocks a full line of scale kits and accessories for both the jet-driven and propeller-driven segments of our hobby.

Though most goodies found on his shelves are from well-known manufacturers, a few are produced by Fio himself. Two that caught my eye are his F-4 dual-nose-gear assembly and his special 7-Down, 7-Left exhaust header. The nose-gear assembly is really self explanatory: it allows you to put dual wheels on a straight  $5/32$ -inch strut



*This Sabre flown by Patti Violet features another sport paint job—this one for the precision flying team called the "Sabre Jets." It's white with bright orange nose and wing panels. The trim and lettering are dark blue.*

that's encapsulated by a Robart scale strut. The exhaust header is quite novel because it addresses the problem of where to direct the tuned pipe in a model of a twin-engine jet that's powered by only one ducted-fan unit! This header places the pipe over to the left and downward so as not to conflict with the bifurcated duct that's needed to split the tail pipe for scale realism. The header adapter is available for the O.S., Webra and K&B ducted-fan engines.



*Fiorenze Hobby Center's new scale accessories for the blow-torch crowd. Dual nose wheels can be used on Yellow's F-4 and similar models. A special exhaust adapter allows the tuned pipe to clear the central tail-pipe divider.*

The other Bobby, Mr. Violet, also has something kind of neat in the works. He is personally addressing the situation that many scale modelers have fallen into. This situation is the one that has something to do with us getting older, slower and somewhat visually handicapped! Yup, Bob Violet Models is finally coming out with a no-kidding scale trainer; one that "builds easy, builds large and is real easy to see."

This model will span about 80 inches, making it legal for IMAA events yet will tool around the sky at a respectable 90 to 100mph. This bird will fly on its wing and be as docile as you could ask for;

(Continued on page 66)



*Past Toledo show winner Jerry Caudle and his new F-86 in sport colors. The Sabre is easy to see and pleasant to look at.*

## A SPECIAL MESSAGE TO RETAILERS

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# PILOT PROJECTS

## A LOOK AT WHAT OUR READERS ARE DOING!

### SEND IN YOUR SNAPSHOTS!

MAN is *your* magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1991. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to:  
Pilot Projects, Model Airplane News,  
251 Danbury Rd., Wilton, CT 06897.



### MARVELOUS MAULE

Pete Blumberg of Mt. Clemens, MI, built this 22½-pound, 1/4-scale MG Maule from an Ikon N'West kit. Powered by an O.S. Max FT 240, this 98-inch-span plane was flown for the first time on January 13, 1991. Pete says it flew beautifully despite the cold; it was only 10 degrees that day!

.....



### STRIKING STINSON

John Mayle of St. Louis, MO, built this 100-inch-span Stinson Reliant from an Ikon N'West kit. The model is powered by a Quadra 40 and controlled by an Airtronics Spectrum radio. The Stinson flew beautifully on its maiden flight, and the lifting power of its flaps is very impressive—especially when demonstrated in level flight.



### HIGH-SEAS HAWKEYE

Lt. Jeffrey J. Laugle—a pilot for VAW-112 based at NAS Miramar—sent us this photo of his E-2C Hawkeye. Modeled after the plane he has been flying for the last two years, the 57-inch, scratch-built Hawkeye has an 82-inch wingspan, and its rotating radome has a 24-inch diameter. The plane is powered by two K&B .61s and guided by an Airtronics 8-channel Quantum PCM (donated by Airtronics!). Its engine nacelles and nose section are of fiberglass cloth; it has balsa-sheeted, foam-core wings; and most of its fuselage is of balsa and plywood. Although construction of a second version of this model was interrupted by Operation Desert Storm, Jeffrey looks forward to flight tests on his return. He's currently aboard the aircraft carrier USS Nimitz (CVN-68).



## MIGHTY MENTOR

SSgt. John C. Wolf (of Keesler AFB, MS) built this neat T-34 Mentor from an Ace R/C kit and finished it with orange/yellow Oracover. Powered by a Magnum 45 Pro engine and controlled by an Airtronics Vanguard, the model is John's first low-winger. Its detailed cockpit has instruments, throttles, radio, seats, first-aid kits, maps and modified William Brothers pilots. The plane also has functional anti-collision lights. John has flown for eight years, and he says that this plane is fast and stable.



## THE ULTIMATE "ULTIMATE"

This photo of Robert Cain's Ultimate Bipe was sent to us by his good friend Reese Fuller of Landover, MD. Reese says Robert's model is the *ultimate* in both flight and finish! Powered by a YS 120 4-stroke, the 11-pound model really burns holes in the sky. It's painted with K&B paint, and Reese says, "I've seen quite a few Ultimates, but none can top this plane in looks or performance!"

## VERY LARGE LANCASTER

First flown in 1985, this 1/12-scale Avro Lancaster B1 Dam Buster is the handiwork of Doug Marsh of Palmerston North, New Zealand. Unfortunately, it crashed on its maiden flight (all four of its engines were coupled to one throttle, and one of the engines failed). Almost completely rebuilt, it has a three-piece wing with two Super Tigre .46 engines in-board and two Super Tigre .23s outboard. The model has pneumatically operated retractable landing gear with 5 1/2-inch wheels. This behemoth weighs approximately 201 pounds.



## FAI EAGLE

Thore Thoresen of Asker, Norway, sent us this photo of his F-15C Eagle. Built from a Philip Avonds kit, this 14-pound, 1/9-scale model is powered by two K&B 7.5cc engines. It flies very well and, with its Turbax I fans, Thore says it will climb on one engine. Finished with the same polyurethane paint that's used on full-size F-15s, the model will be flown in FAI competitions.



**F**LOATPLANES HAVE fascinated me for a long time. In the last ten years, I've designed a variety of amphibious models; most were successful, like the North Star and the Laker (both Balsa USA kits), but some had to be redesigned to reach my expectations. The Aquastar was one of these, but I'm pleased with its present configuration. Over the years, I've learned a thing or two (the hard way) about floatplanes, so if you decide to build this model, stick to the plans so that you don't repeat my mistakes.

by LADDIE MIKULASKO

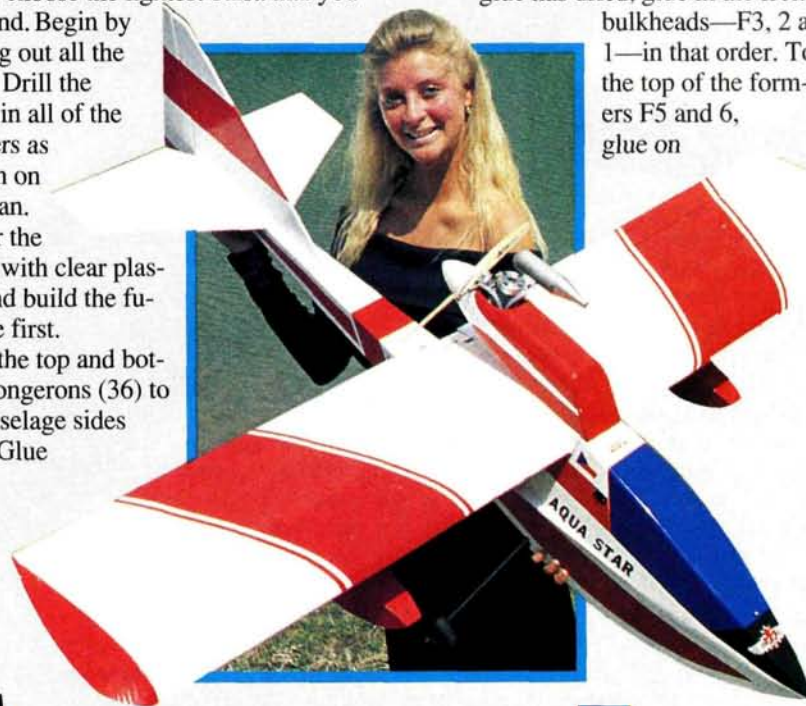


### THE FUSELAGE ★ ★ ★

The Aquastar is easy to build, and the relatively small number of parts will produce a complex-looking model. I chose lite-ply for the fuselage, but balsa can be used, if desired. For the tail surfaces, choose the lightest balsa that you can find. Begin by cutting out all the parts. Drill the holes in all of the formers as shown on the plan. Cover the plans with clear plastic, and build the fuselage first. Glue the top and bottom longerons (36) to the fuselage sides (30). Glue the

### Flies from land or sea.

rear bulkheads (F4, 5, 6, 7, 8, 9), and make sure that the fuselage is square and straight with the plan. After this glue has dried, glue in the front bulkheads—F3, 2 and 1—in that order. To the top of the formers F5 and 6, glue on



# Aquastar



# Aquastar



the wing saddle plate (35). Then glue on the fuselage bottom (32 and 39). If you plan to fly off of land, glue in the hardwood blocks (38) to hold the main landing gear. Glue on the spray deflectors (34) and, in front, the 1/8-inch balsa strip (42). Install and glue all the Nyrods, including one for the receiver antenna.

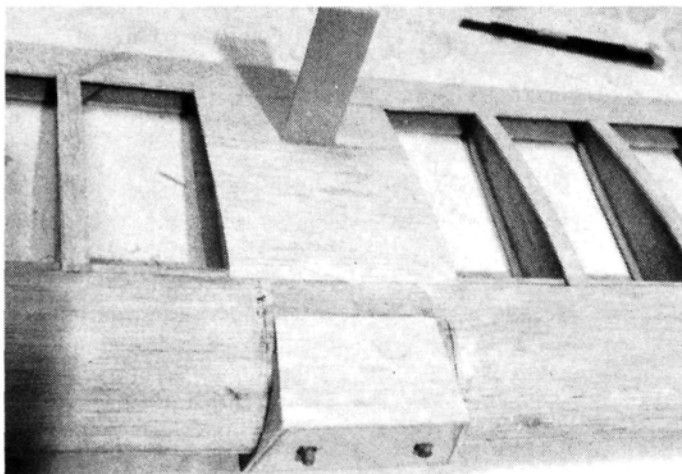
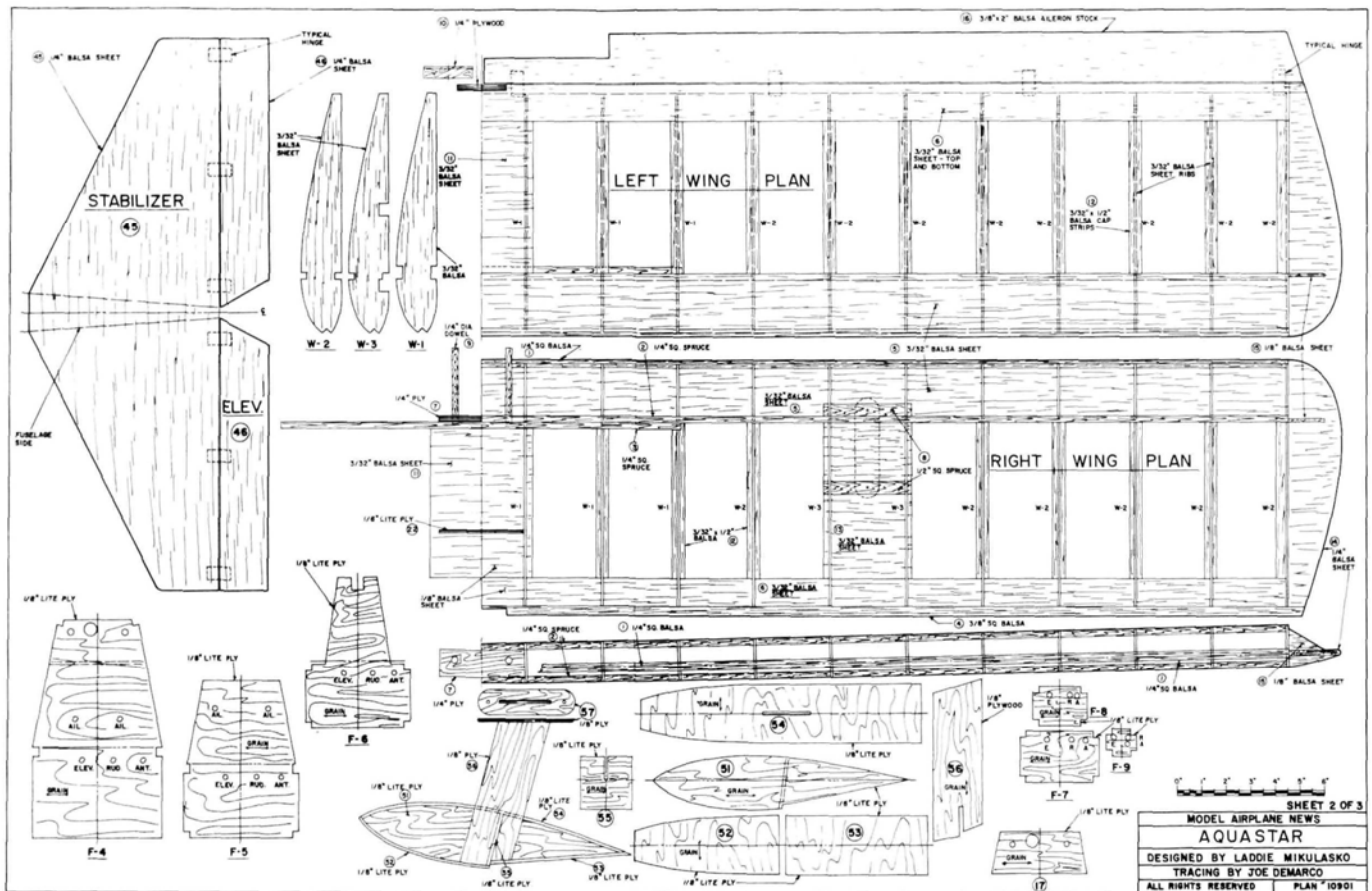
Before you glue on the

top half of the fuselage sides (31), mark the outline of the hatch, and cut it just halfway through, so it will separate easily when the fuselage structure is complete. Now, glue the sides to the formers and to the bottom half of the fuselage, and make sure that you install the aileron Nyrods at this time.

At the rear of the wing saddle, glue in the 1/2-inch

square hardwood block (37). Enclose the top of the fuselage at the front with lite-ply or balsa sheet (33), and glue

the inside of the radio-compartment opening, glue in spruce or plywood strips (43).



on the top sheeting (40). Glue the balsa block (41) to the fuselage nose, and sand the fuselage.

Next, glue the finished stabilizer (45) and the fin (47) to the fuselage. To give it extra support, glue the triangular stock (49) to the base of the fin, and glue on the sub-fin (44). Separate the hatch from the fuselage. On

In the landing-gear vertical blocks (38), drill the 5/32-inch holes that are 1 1/2 inches deep. Don't drill any farther. If you drill all the way through, water can enter the fuselage when the landing gear is removed.

## THE WING

Again, cover the plans with clear plastic. Pin the bottom

*The wing fairing is glued to the leading edge, and it holds the wing's alignment dowels.*

main spar (2) to the building board, right on top of the plan. Glue all the ribs to the spar, and make sure that they're square to the building board. Glue the plywood brace (10) to the trailing edge, and then glue the trail-

ing edge to the ribs. Glue on the leading edge (1) and top main spar (2). Carefully sand the trailing edge to the contour of the ribs. Glue on the top trailing-edge sheeting (6) and the leading-edge sheeting (5). If necessary, wet the

top of the leading-edge sheeting, so that it's easier to bend.

Flip the wing onto its back, and glue on the bottom trailing-edge and leading-edge sheeting. Make sure that the wing panel doesn't develop a twist at this stage. To hold the sponsons, glue the spruce blocks (8) to the ribs (W2), and glue on the wing tip (14).

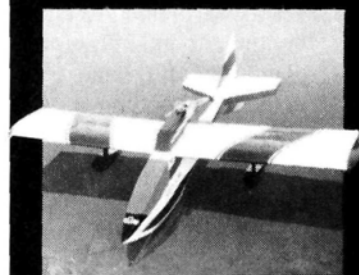
Build the other half of the wing in the same way. Make sure that you do a "left" and a "right." Join the halves in the center with the plywood dihedral brace (7). To achieve the proper dihedral, place one half of the wing on the flat building board, and put a 1 1/2-inch block under the raised wing tip.

"...wet the top of the leading-edge sheeting so that it's easier to bend."

★ ★ ★

# Aquastar

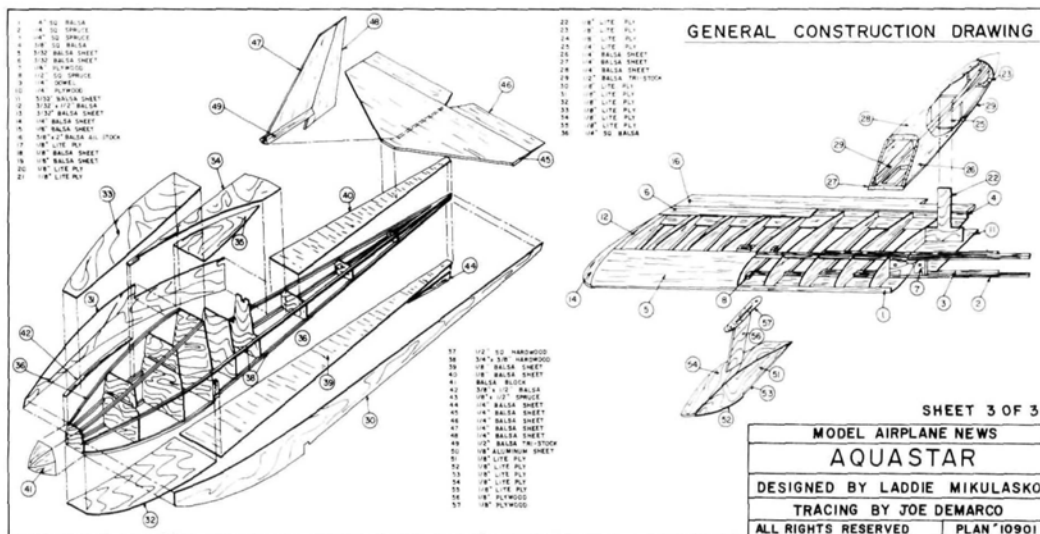
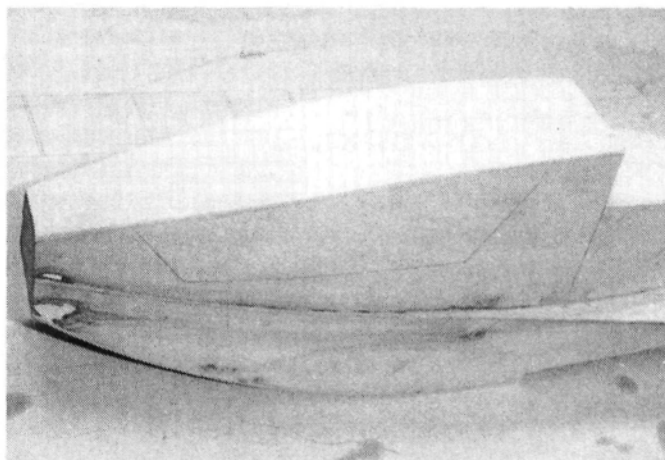
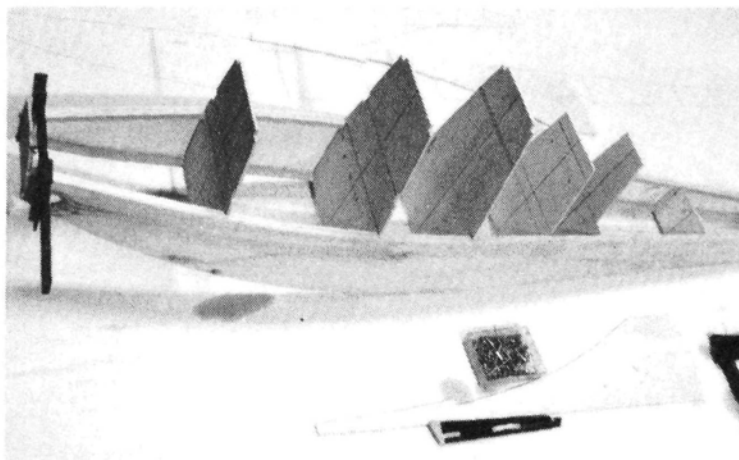
## AQUASTAR SEAPLANE



Designed by Laddie Mikulasko, the Aquastar Seaplane uses a pusher engine and is intended for intermediate builder/fliers. This 4-channel sport model has many proven features that make it one of the best seaplane models. Constructed of balsa and lite-ply, the model is easy to build and fly, and it can be flown from land or water. The three-sheet plans include a complete list of parts. WS: 70"; L: 59"; Engine: .45 to .60 2-stroke glow engine; LD: 2.

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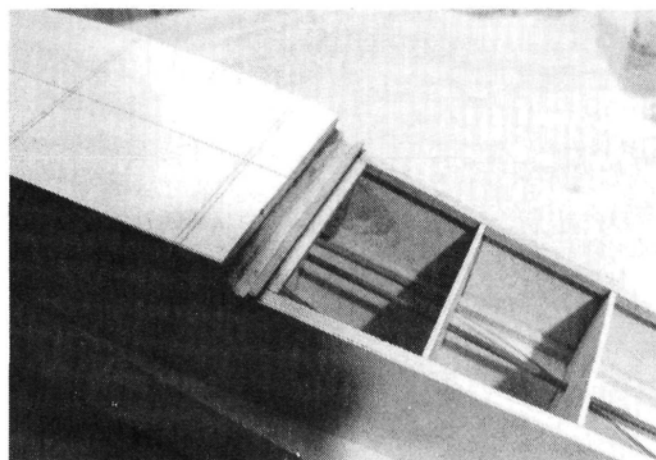
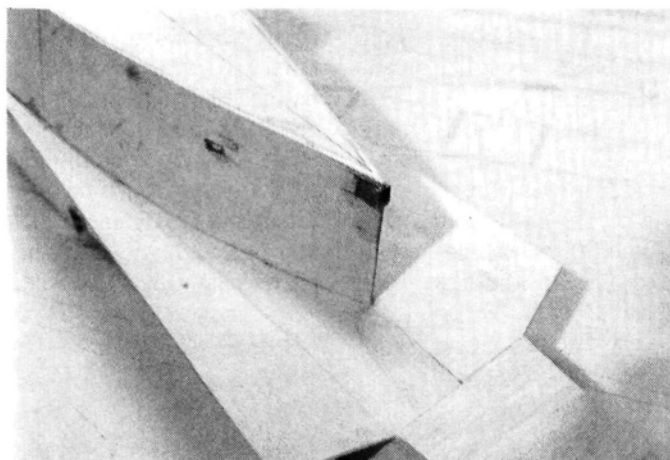
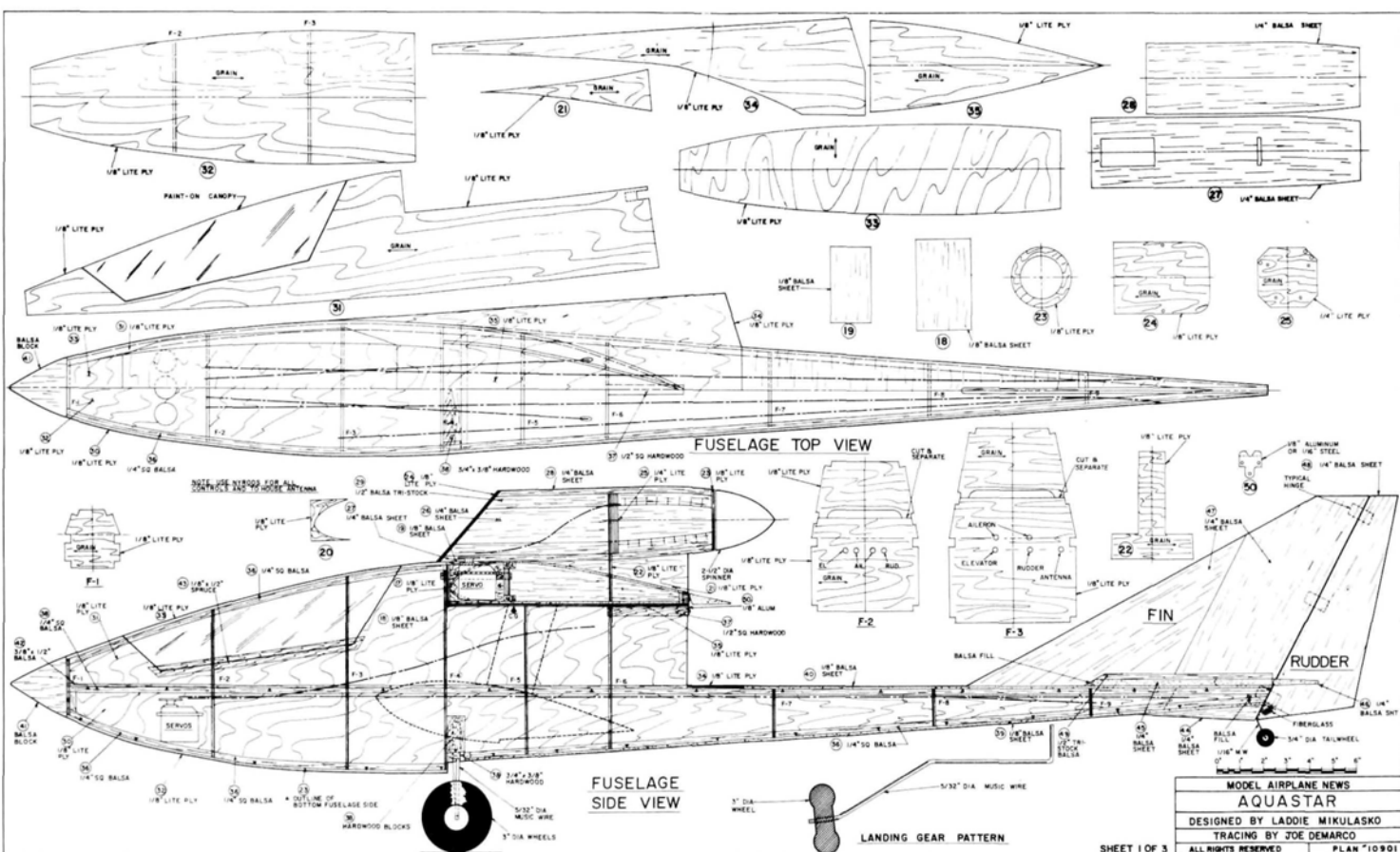
\$20



To give the completed wing more strength in the center, glue in the sub-spar (3) to the back side of the top main spar. When the glue has dried, glue in the bottom sub-spar (3). In the center of the wing, glue on the bottom sheeting (11).

Glue the T-shaped nacelle support (22) to the ribs (W1) and bottom sheeting. It's important that it's in the exact location shown on the





plans and at 90 degrees to the bottom sheeting. Now you can glue the top sheeting (11) and cap strips (12) and sand the whole wing.

Place the wing on top of the fuselage, check the alignment, and glue the plywood wing fairing (pieces 18, 19 and 20) to the leading edge. Glue in the wing dowels (9). Glue the engine nacelle's plywood side supports (21) to the wing's top sheeting

(11) and to the post (22).

Build the nacelle in this sequence:

To the sides (26), glue on the top and bottom triangular stock. If the stock is difficult to bend, cut notches three quarters of the way through that are approximately  $\frac{1}{2}$  inch apart. Glue in the firewall (25) and the plywood ring (23) up front. Glue on the top (28) and bottom sheeting (27).

Sand the nacelle to shape, and cut out the hole to install the engine. Temporarily install the engine mount and the engine. When you're satisfied with the fit, remove the engine, and glue the nacelle to the wing. Make sure that the vertical post is glued to the back of the firewall.

Cut the wing hold-down bracket (50) out of  $\frac{1}{16}$ -inch steel or  $\frac{1}{8}$ -inch aluminum sheet. With two self-tapping

**Above (from left to right):**

■ First, the fuselage formers are cut, sanded and drilled; then they're assembled like a kit.

■ Mark the radio hatch on the upper half of the fuselage side, and cut partially through it before you glue it to the formers. It's easily separated after the glue has dried.

■ Here, the  $\frac{1}{2}$ -inch-square hardwood wing hold-down block is installed at the rear of the wing saddle.

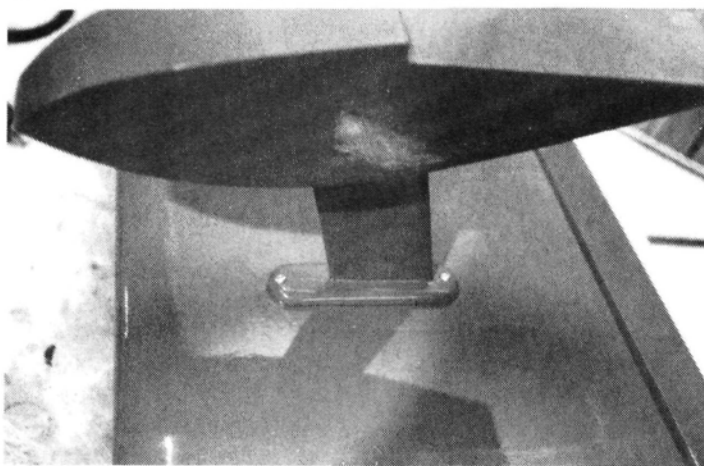
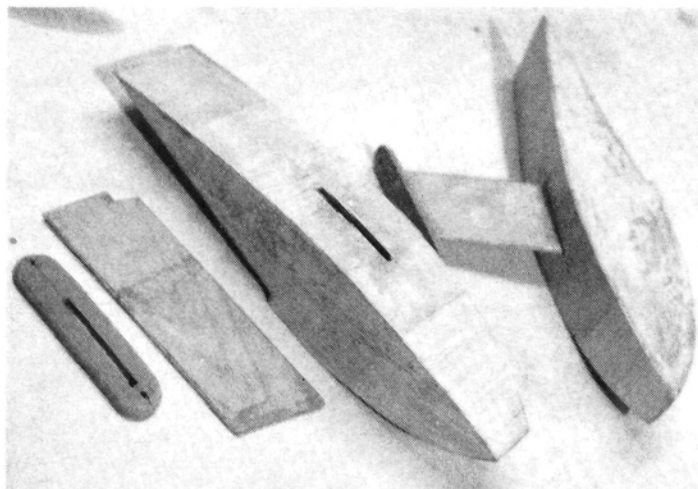
■ The hardwood landing-gear block (if used) is installed just aft of the fuselage step.

Order the full-size plans... page 112.

# Aquastar

★ ★ ★

**"Finish the model with your favorite materials; just be careful with the weight in the tail."**



**Top:** The wing spars are easy to fabricate from balsa and ply. **Bottom:** The spars are attached to the wing by two screws that go into spruce blocks glued to the wing ribs.

screws, mount the bracket to the plywood strip (10) in the wing's trailing edge.

Put the wing on the fuselage saddle, check the alignment, and then drill the hole in the hardwood block (37) to accept the rear self-tapping screw. Build the spon-

sons by gluing the bulkhead (55) to the sides (51). Then glue the bottom sheeting (52 and 53) to them. Glue in the vertical strut (56) and top sheeting (54). At the top of the strut, glue on the plywood plate (57).

Sand the floats. Now the

model is ready for covering. Finish it with your favorite materials; just be careful with the weight in the tail.

Install the hinges, the control surfaces and the servos, and connect all the controls. The engine, the fuel tank and the throttle servo go together in the nacelle. Install the fuel tank with the filling neck facing forward (i.e., away from the engine).

Place the receiver battery at former F1, and check the CG. Most likely, you'll have to add lead to the nose to balance the model. It's extremely important that you use whatever amount of ballast is required to correctly balance the plane. When I was designing this model, I knew there was no way around the ballasting. For this reason, the model has a high-lift wing. All of the ballast should be glued to former F1.

If you're going to fly off a runway, install the main landing gear. Run the engine, and check all of the controls. When you start the engine and adjust the needle valve, be very careful that you don't put your hand into the propeller. It's a good idea to install a remote glow-plug extension and connector, because the propwash of a pusher sucks things into the prop from the engine compartment, rather than pushing them away.

Flying the Aquastar is as

## Specifications

**Type:** Floatplane  
**Wingspan:** 70 inches  
**Wing Area:** 700 square inches  
**Wing Loading:** 24.7 ounces per square foot  
**Length:** 59.5 inches  
**Weight:** 7.5 pounds  
**Power Req'd:** .45 to .60 2-stroke  
**No. of Channels Req'd:** 4 (aileron, rudder, elevator and throttle)

straightforward as flying any other high-wing model. It has no bad habits, and its aerobatic characteristics include stable inverted flight. Flying from water is no different, but I recommend that you set your engine idle one or two clicks higher so that it



**The throttle servo and fuel tank, which are inside the engine nacelle, are easy to service through the forward hatch.**

doesn't quit on landings. A retrieving boat is also a good idea.

Good luck, and enjoy your Aquastar. ■



**Type:** Aerobatic sailplane for slope soaring

**Wingspan:** 58 inches

**Weight:** 32 ounces (review model)

**Wing Area:** 500 square inches

**Wing Loading:** 9.2 ounces per square foot

**Power required:** none

**No. of Channels Req'd:** 2 (ailerons, elevator)

**Sug. Retail Price:** \$59.95

**Features:** balsa-sheeted foam-core wing; simple, strong fuselage design. A very complete kit. Detailed, well-illustrated construction manual includes flying tips.

**Comments:** this well-engineered design can serve as a transitional model for those who want to move from thermal to aileron slope soaring, and it's challenging enough to hold the interest of experienced slope pilots.



## Black belt of the slopes

by DAVID D. GARWOOD

AS I WALKED from the car to the hill, I knew it was a good day for slope soaring because I could see several seagulls flying without flapping. Getting closer, I noticed some of them hovering and even increasing their altitude as they hovered, and I wondered if it would be too windy to fly. There was no need to worry; I was flying the Sig\* Ninja. This aerobatic slope soarer penetrates well, and my first flight lasted 35 minutes in 20mph wind, and it included loops, rolls and formation flying with the gulls.

### THE KIT

The kit includes foam wing-cores, 1/16-inch balsa sheeting,



fuselage sides and bulkheads (die-cut out of 1/8-inch light plywood), and a fin, stabilizer and elevator cut out of 3/16-inch balsa sheet. The trailing-edge stock is notched to clear the aileron torque rods—a nice touch that saves time.



FIELD & BENCH REVIEW



S I G

**Ninja**

*S a i l p l a n e*

PHOTOS BY PAULA GARWOOD

NINJA NINJA



The supplied hardware includes the elevator pushrod, the aileron torque rods, an elevator horn, a clever hatch hold-down device, a wing hold-down bolt (nylon), control rods, control links and the wonderful Sig Easy Hinges. The kit also contained a landing skid, servo-mounting tape and a Ninja logo sticker.

Sig provides a well-written 24-page instruction manual that features 82 photographs and 18 diagrams. It includes additional information on how to make really good sanding blocks and how to make Z-bends in control rods,

ing to the design of the kit, the warped and repaired light plywood made a straight and strong fuselage assembly.

The canopy hatch and its hold-down are ingenious and can be constructed quickly. The tail feathers are cut and require only sanding. I used Sig CA throughout, and it worked well.

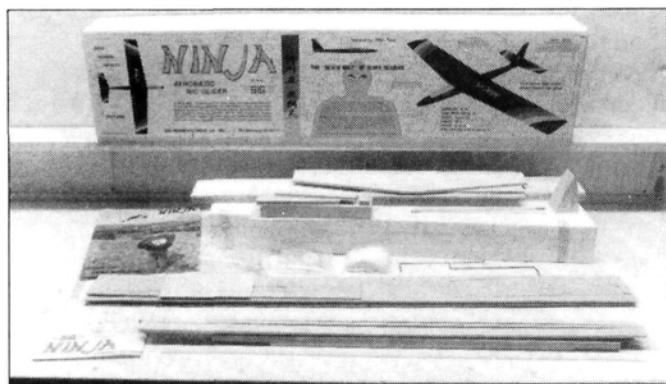
The wing is foam-core sheathed with balsa. For careful builders, this method produces a strong wing with an accurate airfoil. If you haven't built a



point of the wing. Some designers think this makes a stronger wing than having the grain parallel with the trailing edge, and the kit includes enough wood to do either.

I built the Ninja over 10 evenings—32 hours. My only modifications were to use a "T-nut" instead of tapping threads into a plywood block to secure the wing hold-down bolt, and I added a receiver antenna lead-out tube made of soda straws. I also substituted Carl Goldberg Models\* nylon horn brackets and mini clevises in the aileron control linkage, because the hardware supplied fit loosely and produced excessive play. For servo-wheel connections, I made Z-bends in the supplied

*Above left: to finish the Ninja in the suggested color scheme, you'll need two rolls of Sig's black Supercoat and four colors of Sig's Super Trim. The Ninja decal comes with the kit. This is a good-looking airplane!*



*The kit includes foam wing-cores with 1/16-inch balsa sheeting, an instruction manual, and all the balsa, ply and hardware needed to complete the model.*

a discussion of wing-sheeting adhesives, and tips for flying. The plans are less than full-size, but they're sufficient for building the model.

## CONSTRUCTION

Building is straightforward and is explained thoroughly in the manual. The die-cutting was average; I freed the pieces with a little sanding and knife work. The plywood in my kit was warped and discolored. I filled voids in the center ply of a fuselage side with balsa sheet.

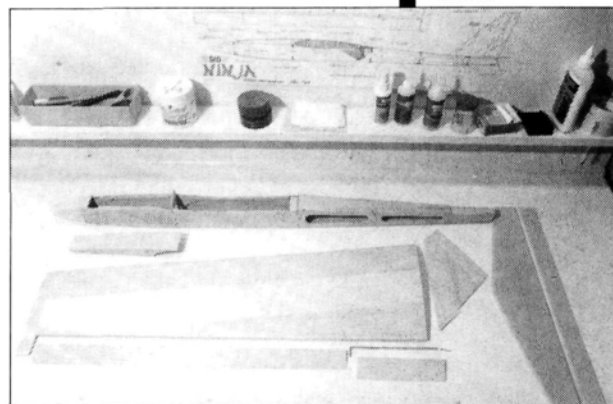
The interlocking fuselage pieces are held together with rubber bands, tack-glued with thin CA, then permanently glued with medium CA. Ow-

ing to the design of the kit, the warped and repaired light plywood made a straight and strong fuselage assembly.

I learned foam-wing construction from a videotape entitled "Sheeting Foam Cores," which is available from Aerosmith Model Aviation\* for \$10, shipping included. This tape is a great confidence builder.

The sheeting in my kit wasn't matched in density, and this made sanding more difficult. It was, however, provided in generous lengths, so the grain direction could be aligned with the leading edge, and could run along the high

*Below: the model's major components nearly ready for final assembly. They include a sheeted-foam wing with the tip in place, but the aileron and control rod have to be attached. The fin, stabilizer and elevator are made of 3/16-inch sheet balsa, and the fuselage and canopy are of die-cut 1/8-inch light ply and balsa.*



threaded rod. Sig's instructions for making Z-bends are detailed and result in good fittings. There's enough control-rod material for you to practice.

# Ninja

## COVERING

The instruction manual contains two well-illustrated pages on covering and explains it well. I followed the suggested color scheme using Sig covering and trim. Sig Supercoat is a low-temperature film that goes on smoothly and easily over sheeted and open areas. The peel-and-press adhesive Sig Super Trim is easy to handle, and it stretched to cover the compound curves of the canopy with the application of a little heat. I like using both materials.

## RADIO INSTALLATION

The Ninja is designed to take radio equipment of a standard size and weight—good for those who want to keep the cost down. I chose a Futaba\* 4-channel Attack system with a pair of S-128

hand tosses, the Ninja showed good manners—stable flight, a flat glide, and smooth and responsive to control input. The Ninja flies well enough for you to toss it to yourself: throw it vigorously, bank quickly into a turn, and fly it back for a catch. To me, this shows that it glides efficiently and maneuvers properly for a slope soarer, and I began to look forward to a real slope flight.

The opportunity for good slope lift came during a trip to Cape Cod. I tossed the Ninja into a 20mph wind over a 55-foot sand dune, and it took off like a rabbit and flew like a bird.

The model is stable, controllable and maneuverable, and it shows no bad habits. Loops are easy to do and pretty to watch; the Ninja has enough dihedral to track smoothly all the way

through loops without needing roll-control input. Its dihedral gives the Ninja stability in upright flight; it will fly hands-off for several seconds at a time, but in-

verted flight requires some concentration and stick work.

The Ninja has a quick roll rate—about one roll in 1½ seconds. I was able to fly somewhat barrel-shaped rolls easily but, perhaps because of the dihedral, I wasn't able to manage a clean axial roll during my first six flights—more than 2½ hours in the air.

Flying in winds ranging from 15mph to 25mph on 55- and 75-foot-high hills, I found that, although the model soars in moderate lift, it seems to perform better in higher winds. It penetrates well, and I had no trouble keeping it out in front of the hill in strong winds. This isn't a light ship, and I wouldn't enjoy flying it in marginal-lift condi-

tions. This model is better for windy weather, and it will fly successfully when many others are being blown back over the slope.

My fears about the fragility of the light, ply fuselage were unfounded. My model has suffered no structural failures, and it has only minor tears in its covering. Also, although I criticized the quality of plywood and the uneven density of the balsa, I haven't seen any flying problems that are attributable to these materials. This is a tribute to the Ninja's designer, who has produced a design that not only flies well, but can also be manufactured at a reasonable cost.

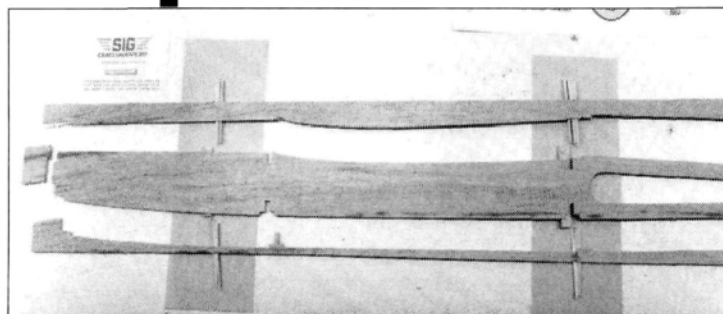
## OVERVIEW

The kit lists for \$59.95. To complete the model, you'll need a 2-channel aviation-band radio set, CA, epoxy and foam-wing sheeting adhesive. To finish the model in the colors shown, you'll need two rolls of black Sig Supercoat (\$9.95 each) and four colors of Sig Super Trim (\$5.95 each).

The Ninja is a carefully engineered model, and the kit is particularly complete. The inclusion of Sig Easy Hinges, foam tape and the landing skid are unusual touches that give modelers extra value. The model flies very well within its intended performance envelope; it's stable enough to learn with and agile enough to keep experienced fliers interested.

**Editor's note:** Sig informs us that voids were present only in the wood of earlier kits. They've discontinued the use of sieba light plywood.

\*Here are the addresses of the companies mentioned in this article:  
Sig Mfg. Co., 401 S. Front Street, Montezuma, IA 50171.  
Aerosmith Model Aviation, RD 1 Box 290, Athens, NY 12015.  
Carl Goldberg Models, 4734 West Chicago Ave., Chicago, IL 60651.  
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718. ■



The wood in this kit was below average in quality. The toothpicks show the voids in the center ply of the fuselage plywood, which was repaired before assembly with 1/16-inch balsa and slow-setting glue. Nevertheless, the completed fuselage is strong.

servos. The aileron servo is mounted at the center of the wing with screws, and the elevator servo is mounted to the side of the fuselage with double-sided foam tape, which is provided in the kit. If you can't live without stall turns, there's room for an optional third rudder servo.

The wing weighed 12¼ ounces; the fuselage, 10 ounces; and the radio, 7½ ounces. I added 2¼ ounces of nose weight for balance, and that brought the Ninja's flying weight to 32 ounces.

## PERFORMANCE

I did preliminary trimming and flight testing at a local schoolyard. From the initial



# FLOATING

## A R O U N D

by JOHN SULLIVAN

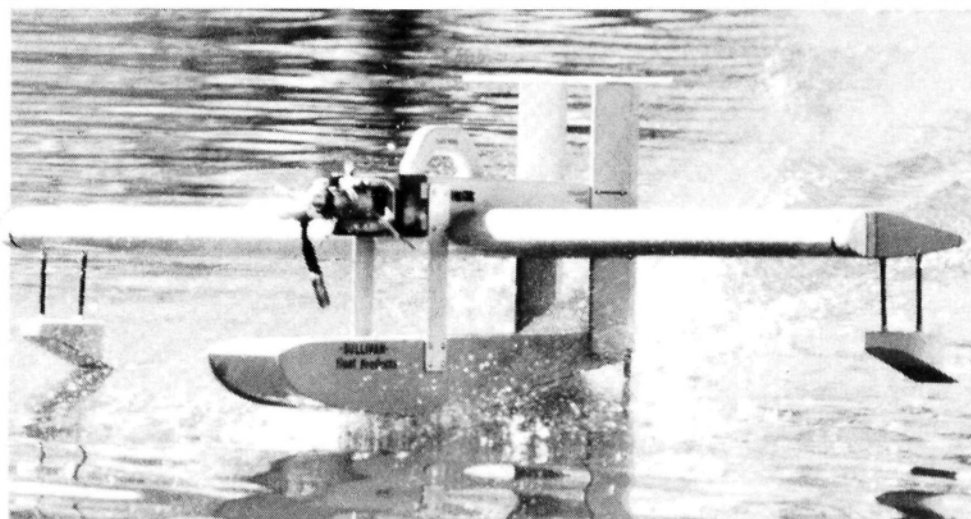
### New products, step modification and float basics

**I**N THE LATEST batch of magazines, I found four announcements of new float products, and word is out that R/C World in Florida plans to stage the largest model float meet ever this summer. It looks as if 1991 will be a banner year for float flying!

#### WHAT A BEAST!

**W**e're already on our third production run of Ed Westwood's "Beast,"\* which we previewed in last October's special float issue, and reaction has been very positive. The Beast is quite possibly the smoothest floatplane I've ever flown, and it's a tribute to the persistence of Ed Westwood and Paul Weston: they built nine prototypes to get it right!

On low rate, the Beast will fly at  $1/4$  throttle with full up-elevator and still have total aileron control. Lomcevaks, inverted flight



*The Beast is out! The production prototype of Ed Westwood's fantastic sport seaplane skims the placid waters of Lake Hennessy in a right-hand sweep. The Saito .65 is at  $1/3$  throttle.*

and outside loops are a breeze, but this plane's most remarkable aspect is its neutral pitch trim. You can slam the throttle all the way to the wall, or yank it back to idle, and the nose remains pointing straight ahead! Congratulations to Ed and Paul. It's refreshing to know that designers still have a trick or two up their sleeves for the future of model aviation!

#### THE FLOATING MARKETPLACE

**B**alsa USA\* has introduced a new  $1/3$ -scale Cubkit, which you can build as the J3, the L4, or the

clipped-wing version. The kit includes extensive scale detail parts, and the model pictured in the company's ads is simply fantastic.

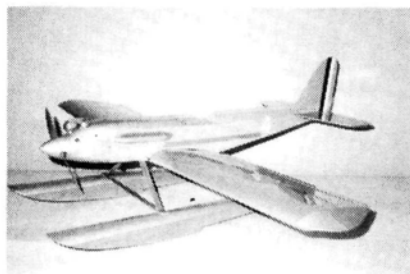
To me, the real news is that Balsa USA sells true-scale EDO floats to go along with its  $1/4$ - and  $1/3$ -scale Cubs. The company calls the EDOs the best float kits available anywhere, and I agree. They include scale metal fittings, water rudders, toe rails, chine strips, fork fittings, spreader bars, struts, rivet details—the works! I imagine that these kits aren't an overnight building job—to say the least!—but at \$130 for the  $1/3$ -scale EDOs and \$110 for the  $1/4$ -scale ones, the price is right on!

U.S. Air Core Model Manufacturing\* has introduced a 36-inch float kit to fit its Corostar 40 and Aircore 40 kits, as well as .40- and .60-size planes in the 4- to 7-pound range. The

floats are constructed of the company's own air-core material, and they should take approximately 2 hours to build. A landing gear made of air core and steel, deck hardware and spreader bars are also provided with the kit.

The proportions of the floats, the rocker and the cutaway angles appear to be adequate, although somewhat squared off (this is probably because of the air-core material). I haven't had a chance to try these floats yet, and I'd appreciate hearing your comments. I *do* like the "Discover the Adventure" phrase in Air Core's ads. Float flying is definitely an adventure with a high return in fun and excitement.

This month's final offering comes from a new company, CK Models,\* which is a division of Krashenburn Industries.



*C.K. Models' new .40-size Schneider Schtick-MK-II can be built as a Supermarine or Macchi look-alike using the vacu-formed parts included in each kit.*

## T H E SCHNEIDER CORNER

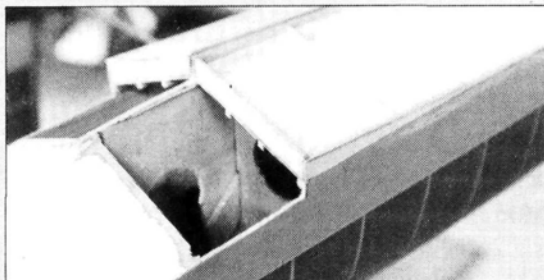
It's quiet along the beach at Havasu, and Bob Martin\* and the Desert Hawks are taking a well-deserved rest. I've heard about the Hawks' Fun Fly, which was held on the weekend after the Schneider Cup. Jack Wismar reports that the weather was great, and that more than 120 floatplanes and 100 pilots were registered. If anyone out there has pictures, send them along, and I'll try to put them in "Floating Around."

### BELLY TROUBLE

Several of the Schneider entrants were having trouble with high-speed "porpoising," and in some cases, uncontrollable veering and water looping on takeoff. In all cases, the problem seemed to be the result of a "belly" in the rocker area of the float (forward bottom). In a high-speed taxi attitude, this "belly," which is drawn in front of the step on several of the available plans, becomes the lowest point on the float. This causes the rushing water to alternately "attach and break," and this, in turn, causes porpoising. Imagine driving a sailboat hull through the water at 60mph, and you'll see

what I mean!

I've received photos of a float modification to one of the Schneider craft from a modeler who wishes to remain anonymous (more on that later!). The solution involved moving the step forward 4 inches so that it's 1 inch behind the plane's center of gravity. Then, a straight run (or keel flat) was established



*An inverted shot of this month's mystery float. Originally, the step was located at rear of open cavity; after the modification, it's 4 inches forward. A flat keel run has been framed up on the near side and sheeted on the far side. This modification eliminated "porpoising" and "wheelbarrowing."*

from the lowest point of the "belly" back to the step. This extension results in a step height that's equivalent to 2 percent of the float length—a figure I've recommended for sport floats for years. The modifications for this particular float were engineered by Rockwell in Southern California (talk about connections!), and they eliminated all the problems.

### CATCH-22

Unfortunately, the modifications exceed the 10-percent limit for outline

variation in Sport Scale rules, which also apply to the Schneider planes. This is a catch-22 that has always bothered me about scale modeling: we faithfully reduce the size of a full-scale aircraft, blithely ignore the design criteria that were used to create the original (e.g., Reynolds Numbers, appropriate airfoil sections, inci-

dence setups, power-to-weight ratios, etc.) and then expect our models to fly realistically!

So, for the moment, the aforementioned modeler chooses to remain in hiding. His plane performs beautifully, but he's afraid to show it to the static judges! What's needed is a change in the Schneider Rules to allow float modifications that, although they exceed the 10-percent rule, enable the plane to take off and land safely and reliably. How about it, Bob?

Conrad Kantor has taken a Schneider-type design for .40-size engines by Ron Ogren and produced a kit he calls the "Schneider Schtick-MK-II." A unique feature of the kit is that Conrad provides blow-molded parts to make

either Supermarine or Macchi look-alikes.

Ron and Conrad have told me that they're excited with the Sport Schneider, and they're having a lot

(Continued on page 44)

## MASTER AIRSCREW

- Efficient wide tips and thinner airfoil sections combine for greater thrust, more noise suppression.
- Will out-perform wood & other plastics on water and on sand & gravel runways.
- Made of strong, 33% glass-filled nylon.
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9x8, 9.5x6.....	1.55
10x6, 10x7, 10x8....	1.75
11x6, 11x7,	
11x7.5, 11x9.....	1.95

### K Series:

12x6, 12x8.....	2.85
13x6, 13x8.....	3.85
14x6, 14x8.....	4.95
15x8, 15x10.....	5.45
16x6, 16x8.....	6.65

### Antique Series:

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12x6.....	3.35
13x6.....	4.35
14x7.....	5.45
16x7.....	7.15

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**Charlie McCracken's Sig Kadet Senior on Lake Poway in Southern California. This 84-inch "light-weight" is step-planing and barely disturbing the water.**

of fun. The Schtick seems to have a generous wing area and moments, and Ron says it's a real pussycat. With a finished flying weight of 5

pounds, the 54-inch-span Schneider can fly off small lakes and large ponds comfortably. Plans are also available; contact Conrad for prices and availability.

### THE FLOATING MAILBAG

Readers of *MAN* will remember that Ed Zemaitis of Harrisburg, PA, won our 1990 "Pilot Projects" Con-



**Marvin Combs of Alberta, Canada, on his private dock. The plane on the left is derived from a Fokker Super Universal; Bill Gellespie designed the 17-year-old flying boat on the right.**

test with his scale PBM-5A Amphibian. His is actually the *second* PBM to grace the pages of *MAN*. William Henry, of Mashpee, MA,

called to remind me that John Nicolaci built a giant-scale PBM-3 that appeared in 1975! A few days later, John himself sent a video of his 11-foot-span Mariner.

The plane flies like a giant Telemaster and performs outstanding high-speed, on-step taxi runs, but the amazing thing is that Nicolaci has outfitted it with real JATO units! The spectacle of the Mariner taking off (at night!) is awesome! I understand that either of these PBMs might show up at some of the big East Coast meets, such as Lake Sebago,

## FLOAT BASICS • • •

We've added a new section to "Floating Around," because several readers have pointed out that it's been a while since I reviewed the basics of float flying. They're right, and I apologize. As float flying grows in popularity, it's easy to be swept along by the tide of events, products and projects and forget that many of you are just beginning your first float venture.

Without a doubt, the question I'm asked most frequently is, "What size floats do I need for my plane?" To get you started, here's a chart taken from the Sullivan Float Products brochure:

FLOAT SIZE	FUSELAGE LENGTH	BUOYANCY W/80% RESERVE AVERAGE	ENGINE SIZE
28 inches .....	32 to 37 inches .....	5 pounds .....	15 to .20
32 inches .....	37 to 42 inches .....	9 pounds .....	30 to .40
36 inches .....	42 to 47 inches .....	13 pounds .....	50 to .60
40 inches .....	47 to 52 inches .....	17 pounds .....	60 to .80
44 inches .....	52 to 57 inches .....	21 pounds .....	90 to 1.2
48 inches .....	57 to 62 inches .....	25 pounds .....	1.2 and up

Fuselage length is the primary factor that determines what size floats you should select for your plane. The above figures are based on an "80-percent rule." To arrive at the proper float length for your plane, multiply the fuselage length (prop hub to rudder hinge line) by 80 percent. For example, let's say that your fuselage is 45 inches long. If you multiply 45 inches by .80, you get 36 inches, so you should use a 36-inch float.

The next question is: "What if my fuselage is 47 inches long? Do I use a 36-inch float or a 40-inch float?" Not all fuselages are created equal. Fore and aft moments can vary widely depending on what's required of the aircraft. Trainers usually have long moments to dampen pitching, while a scale biplane will often have a short nose section because the original plane had a heavy radial up front.

There's a second criteria to use in conjunction with the 80-percent rule. First, assume that the step is located halfway along the float hull. (This is true for most commercially available floats.) Now, take a tape measure and pull out 36 inches. Position the 18-inch mark under the plane's CG. Does the end of the tape extend at least 2 inches in front of the prop disk? If it doesn't, you probably need a 40-inch float. To verify that, pull out 40 inches of the tape measure, place the 20-inch mark under the CG, and check again for that *minimum* 2-inch bow extension.

When in doubt, use the longer float. You'll be amazed by how easily a 10mph crosswind can roll a floatplane with undersized floats. Next time in "Float Basics," I'll discuss how to establish the correct float attitude.



**Ron Ogren of Orchard Park, NY, flies his Schneider Schtick on a beautiful July day. Landing strips never look this good! Even on small lakes, a retrieval boat is a must.**

Brimfield and Holyoke, so try to catch these great amphibians.

Float fliers in Canada have it made for flying sites. Marvin Combs sent me a shot of his lake in Alberta on a summer day. The plane Marvin is holding is scratch-built and loosely based on the Fokker Super Universal G-CASK. Marvin took videos of his SK on 44-inch Sullivan

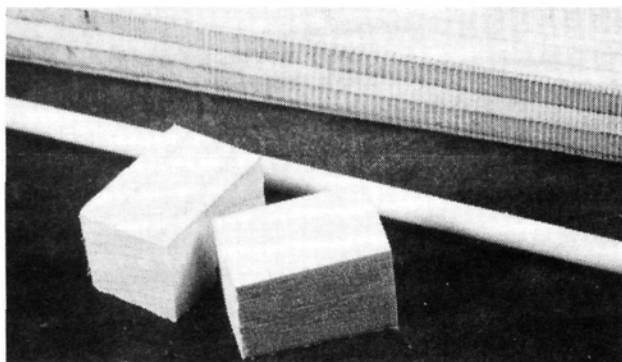
(Continued on page 67)

# HOW TO:

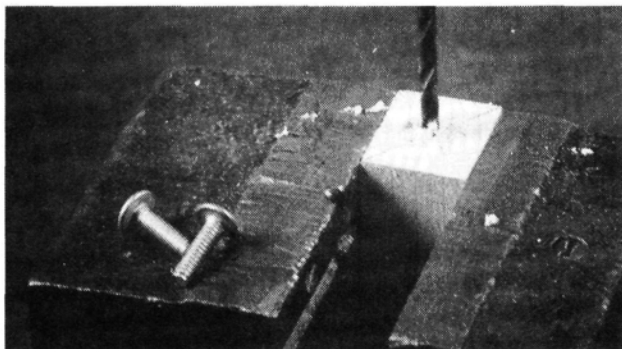
by RANDY RANDOLPH

## MAKE A DIHEDRAL SUPPORT

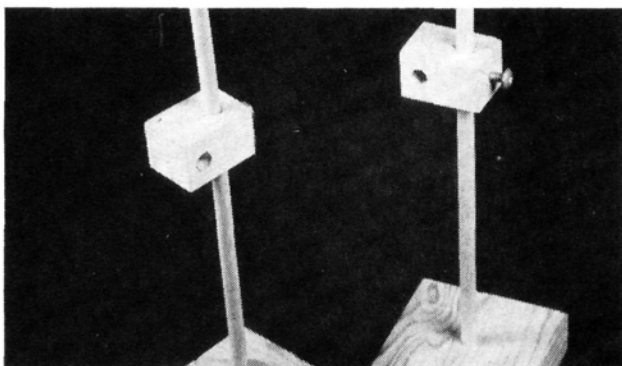
*When gluing dihedral braces in place, most of us use books, bottles, cans, or whatever is handy to support wing tips. Using a simple dihedral support that can be adjusted to any height is a much better solution. The photos show how to make one.*



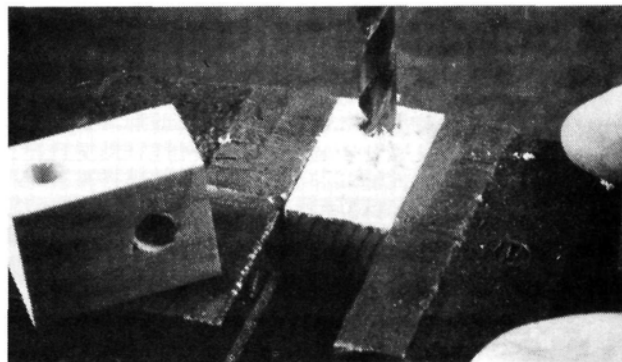
1. The required materials are a  $\frac{1}{4}$ x36-inch hardwood dowel; two pieces of  $\frac{1}{2}$ -inch plywood that are about 4 or 5 inches square (note: the size of the plywood squares isn't critical but, up to a point, the larger they are, the more stable the support will be); two  $\frac{3}{4}$ x $\frac{3}{4}$ x1-inch hardwood blocks; and, for setscrews, two  $\frac{1}{2}$ -inch-long no. 6 machine screws.



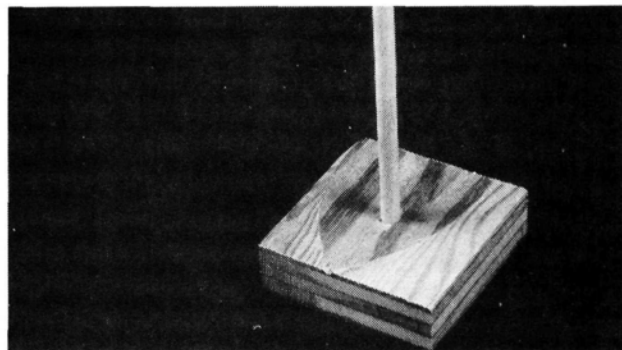
3. Drill a  $\frac{3}{32}$ -inch hole in one end of each block so that it intersects one of the  $\frac{1}{4}$ -inch holes. The  $\frac{3}{32}$ -inch holes will be used for the setscrews.



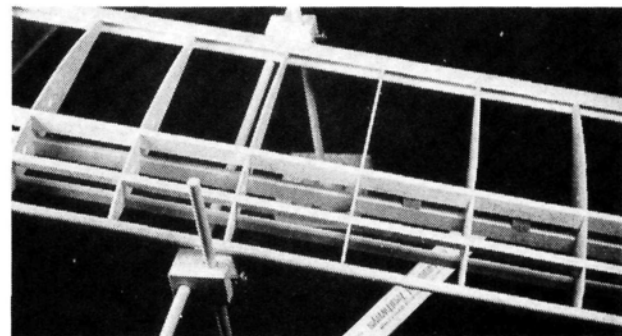
5. Cut two 10-inch-pieces of  $\frac{1}{4}$ -inch dowel, and glue them into the holes in the plywood bases. Slip the hardwood blocks onto the dowels using the  $\frac{1}{4}$ -inch holes that are intersected by the smaller holes for the setscrews.



2. Drill a  $\frac{1}{4}$ -inch hole through one end of the hardwood block. Then, in the opposite end, drill another  $\frac{1}{4}$ -inch hole that's perpendicular to—but doesn't intersect—the first one. Repeat this procedure on the second hardwood block.



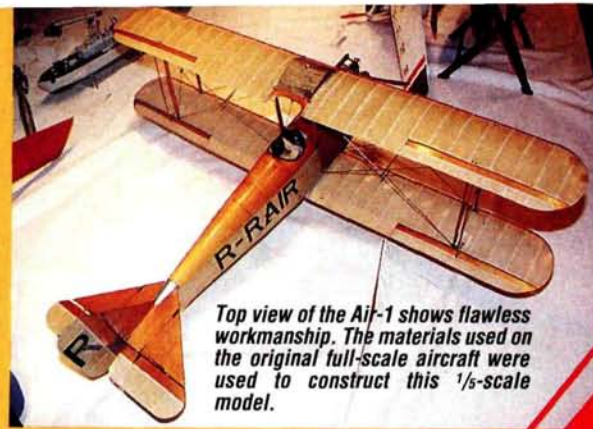
4. Drill a  $\frac{1}{4}$ -inch hole in the middle of each  $\frac{1}{2}$ -inch plywood square.



6. To use the support, slip a 16-inch-long piece of  $\frac{1}{4}$ -inch dowel through the remaining  $\frac{1}{4}$ -inch holes in the hardwood blocks. Position the blocks at the proper height on the dowel/plywood-base assembly, and tighten the setscrews to hold them in place. Usually, both blocks are positioned at the same height, but you can build wash-in or wash-out into the wing by raising or lowering one side of the support.



# F R O M RUSSIA With Models



Top view of the Air-1 shows flawless workmanship. The materials used on the original full-scale aircraft were used to construct this 1/5-scale model.

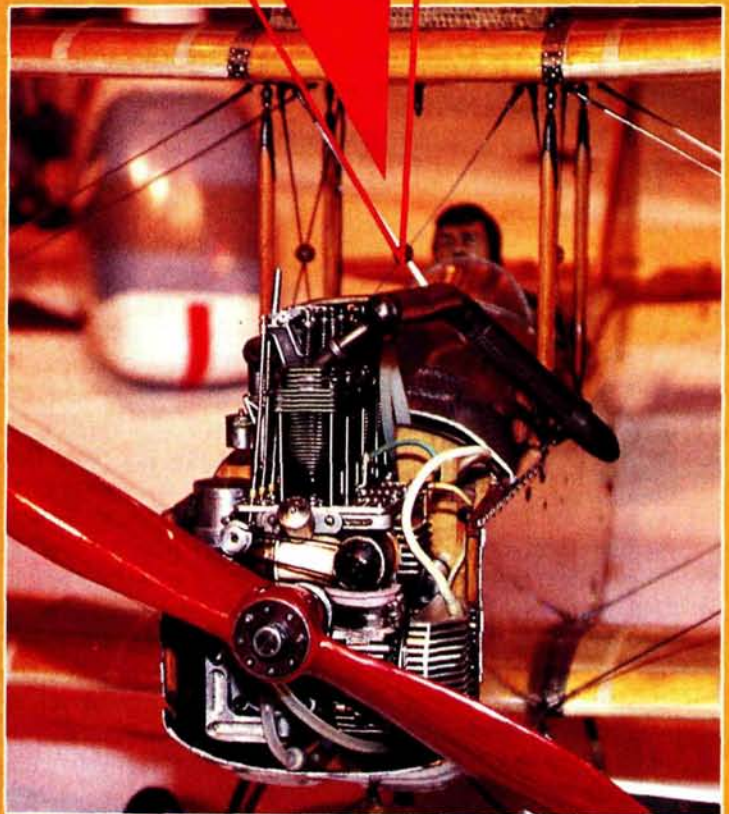
**I**MAGINE A world-record-holding R/C helicopter built entirely from scratch, with all of the mechanics, the rotor head, the blades—everything except the engine and radio—hand-built; or a 1/5-scale vintage Russian biplane constructed from the same materials used in the original aircraft. This is only the beginning of what the Soviets brought to the 1991 WRAM show, held in White Plains, NY, on February 22 through the 24.

The annual show is the largest aeromodeling exhibition on the East Coast. This year, over 160 exhibits were spread over three floors, all jam-packed with the latest kits and modeling products. There was a sense of excitement in the air that was contagious. In this modeling wonderland,

Right: Vladimir Bulatnikov's Air-1 with the cowl removed; note the Webra .61 snugly concealed beneath the scale, Cirrus engine.

*I found the Soviet exhibit the most fascinating.*

Eleven master modelers and modeling businessmen made up the Soviet delegation—the first such group ever to visit a U.S. modeling show. Soviet models won several awards, including Best in Show, Flying; 1st place in Helicopter; and 2nd in Gliders/Sailplanes. The engines, the scratch-built models, the kits and the modern building materials (e.g., fiberglass, carbon-fiber strips and graphite) in the Soviet exhibit were noteworthy.



## S o v i e t   a e r o m o d e l i n g   a t   W R A M S

### MONTHS OF PLANNING

Jerry Judge (WRAM president) and Howard Kuhn, an officer of the FAI and chairman of the FAI Subcommittee on Space Modeling, described the visit as 18 months in the making. Following WRAM's initial overtures to the State Department and the Soviet Consulate in late 1989, WRAM officials linked up with Howard through the AMA. The Soviets know Howard well. They awarded him the prestigious Yuri A. Gagarin Medal for his aeromodeling work in the USSR. (He coordinated a major international FAI competition in Kiev, among other activities). His personal contacts in the USSR helped to make the 1991 meeting a reality.

by TOM ATWOOD



This completely scratch-built, ducted-fan unit includes an OPS .45 engine and a 5-blade impeller. It's reported to generate 3.23 to 3.5 kilos of thrust.



# **RUSSIA**

## **THE SOVIET MODELERS**

The visiting Soviet group was led by Albert Nazarov, chief of the Central Sporting/Technical Aeromodeling Club of the USSR (CSTAMC USSR), which is roughly the equivalent of our AMA, but with a more encompassing, almost ministerial role in overseeing



Close-up shows the installation of a Graupner MC-18 radio.

aeromodeling activities. Traveling with him were seven top, award-winning Soviet modelers, businessmen and an editor of an emerging Soviet aeromodeling sport magazine.

The Soviets came to the U.S. with an interest in developing contacts on multiple levels between modelers here and in the USSR. Individual Soviet modelers in the delegation also expressed interest in receiving mail from U.S. modelers.

A variety of Soviet model products—some scratch-built by individuals and others manufactured by Ros-Aeroprogress\*, a Soviet aircraft design and manufacturing concern—were

offered for sale. These included model airplane engines, airplane kits, helicopters, folding props, tapered composite fuselage tubes, carbon-fiber spar strips, a scratch-built ducted-fan unit and de-thermalizing timers.

There were some real bargains as well as collectors items that were appropriately priced. Modeler Russ Pribanic bought a sailplane kit at the show price of \$125. Russ notes the plane "has a fiberglass fuselage, and all flying surfaces are made of a thin laminate of foam, carbon fiber and smooth gel-coat, which makes for a strong, light airplane. Very high-quality workmanship—in this country it would be tough to get just the materials for this price." We'll have more information on this ship in a future issue, as Russ plans to do a Field & Bench Review.

The Soviets provided a catalogue that lists many of the products for sale. Modelers or dealers seeking further infor-



This plastic control-line kit is modeled after the famous Soviet WW II fighter-bomber, the IL-2, and it's powered by an MK-17 diesel micro engine. It's a manufactured item, available for export.



Michail Pruss's scratch-built, world-record-holding helicopter. Note the medals that Michail has won with this machine!

mation can write to Ros-Aeroprogress.

## **SOVIET MODELING MASTERPIECES**

A few of the models brought by the Soviets were knockouts.

● **Air-1:** This stunning, 1/5-scale biplane built by Vladimir Bulatnikov of Moscow is a completely scratch-built model of the Air-1. It received the Best of Show award. The full-scale aircraft was designed by Alexander Yakovlev in 1927 (Yakovlev's first aircraft design and the first Soviet aviette). The original was covered by cloth impregnated with colorless nitrocellulose lacquer. Plywood parts of the fuselage, fin and front parts of the rudder and ailerons were lacquered, but not cloth-covered.

Covered in natural silk, the Webra .61-powered model is a precision-scale reproduction that uses the same materials and construction techniques as the original. It has a wingspan of 1,760mm (69.3 inches), a wing area of 75.6 square decimeters (1171.7 square inches) and a length of 1,600mm (63 inches). The model weighs 5,200 grams (11.5 pounds) for a wing loading of 68.8 grams per square decimeter (22.6 ounces per square foot). The plane uses seven channels

and includes a pilot who moves his head and the stick during flight.

The original engine was a 4-stroke GTC Cirrus (UK). Vladimir scratch-built a scale replica of the original engine, complete with moving rockers and functioning valves. This scale engine is built over and around the Webra (see photo): the belt that powered the generator on the original now supplies motion to the scale replica! As a final touch of



Alexey Shchegolev holds his F3B sailplane

realism, exhaust is piped from the Webra through the cylinders of the scale engine and out through the scale exhaust pipe. The model was a modeling masterpiece. Vladimir is planning a construction article for

(Continued on page 52)



**"Very high-quality workmanship—in the U.S., it would be tough to get just the materials for this price."**

## A CHAT WITH THE CHIEF

*Albert Nazarov, chief of all organized Soviet modeling, shared some of his scarce time at the WRAM show with MAN contributing writer Ron Farkas and me. We were keen to learn about modeling in the Soviet Union. Howard Kuhn, an old friend of Albert's, provided an introduction based on his own extensive experience with Soviet modeling.*

**Howard:** Mr. Nazarov heads the Central Sporting/Technical Aeromodeling Club of the USSR, a part of the Federation Aeronautique DeSporta (FAS is the main Soviet aero club, which includes full-scale aviation) that administers all modeling activities in each republic in the Soviet Union. We have no comparable activity here in the U.S. that encompasses all modeling. Notably, the Soviets often use modeling as part of a professional career development path; many of their more accomplished modelers pursue careers in their design bureaus and aerospace industry as engineers. Whereas we typically look upon aeromodeling as a hobby, the Soviets have traditionally viewed it as a means of teaching a very complex subject.

Formal aeromodeling activity in the Soviet Union consists mostly of local and national competitions based on FAI rules. This prepares them for world championships, where they're quite active. Modeling centers throughout the Soviet Union are very similar to our community centers, except that everything is devoted to hobbies. They have lathes, drills—all kinds of tools, all furnished by the government. They really do a fantastic job of equipping their modelers. Modelers who become seriously involved advance through a sort of apprenticeship.

**Ron:** How many people are involved in aeromodeling in the Soviet Union?

**Albert:** About 300,000 modelers participate in competitions each year, from smaller counties to large cities across the Soviet Union. The total number of modelers is larger.

**Ron:** Are many involved in modeling just for recreational purposes?

**Albert:** These numbers really include all people who are interested—those who are pursuing a career in aviation



Left to right: Howard Kuhn, Ron Farkas, Alexander Gukkin and Mina Dolin (translators) and Albert Nazarov.

and those who just like to model. Those who don't have a career association are in it for fun, and for some, of course, this can be a full-time pursuit outside their jobs.

**Tom:** Who sponsors modeling competitions?

**Albert:** Traditionally, competitions have been government-sponsored, but now there are some emerging organizations that may be holding their own contests. Local flying clubs may get together to hold a contest.

**Tom:** What percentages are involved in R/C, free flight and control line?

**Albert:** It breaks down to about 30-percent control line, 60-percent free flight and 10-percent R/C. There are tiers or levels of modeling, and the proportions may vary depending on the level. The more senior modelers who

compete in FAI competitions are likely to have greater involvement with R/C.

**Tom:** What types of engines are Soviet modelers using?

**Albert:** For regular models from different parts of the country, there are some 80 or 90 different types of engines. For special competitions, some modelers machine their own engines, either based on their own designs or on plans. FAI competition rules set standards for the

types of engines used as well.

**Ron:** Where do modelers do most of their modeling, and how much of their time do they spend?

**Albert:** Modeling is done primarily in the clubs. The time spent is up to the individual—two days a week, every night; it depends on your schedule. Some models may require thousands of hours.

**Ron:** Where does a flier go to fly?

**Albert:** As in the U.S., there are county- or city-designated areas with flying fields that are sanctioned by the sport-plane model union.

**Howard:** I've seen flying activity near Kiev, where there are two fields that are very well equipped. These sport airfields also include other activities: gliders, parachute jumping, flying light planes and helicopters—all managed

under the federation. They also have some specialized areas, like those designed strictly for control line.

**Tom:** Can you tell us about the modelers who visited the WRAM show and how they were selected?

**Albert:** Top modelers were chosen, including three three-time Soviet national champions, and a world-record-holding helicopter pilot who built his helicopter with his own hands. Some businessmen, who would like to introduce themselves and bring products to the U.S. hobby market, are also in the group.

**Tom:** Can you tell us about the status of aeromodeling in the Soviet Union—how it's viewed?

**Albert:** I have an example. Do you know the name Antonov? He's the famous Russian aircraft designer. It's partly meant in humor, but he once said that he would be more impressed by an accomplished modeler with, for example, a bookkeeping degree than a non-modeler with a degree in aeronautical engineering. Building a model gives you a kind of practical experience that can't be gained by just reading a book. If you don't have an engineering background, yet, through perseverance, you create a model plane by yourself, it gives you credibility.

**Tom:** It sounds as though modeling is held in high regard in the Soviet Union.

**Albert:** This is natural, and it's understandable.

**Tom:** We'll share your comments with our readers, and we'd like to thank you for this opportunity.

**Albert:** Thank you; very nice to meet you. We'd also like to thank those on the U.S. side who helped make our visit possible, including the WRAM modeling club and Howard.

# RUSSIA

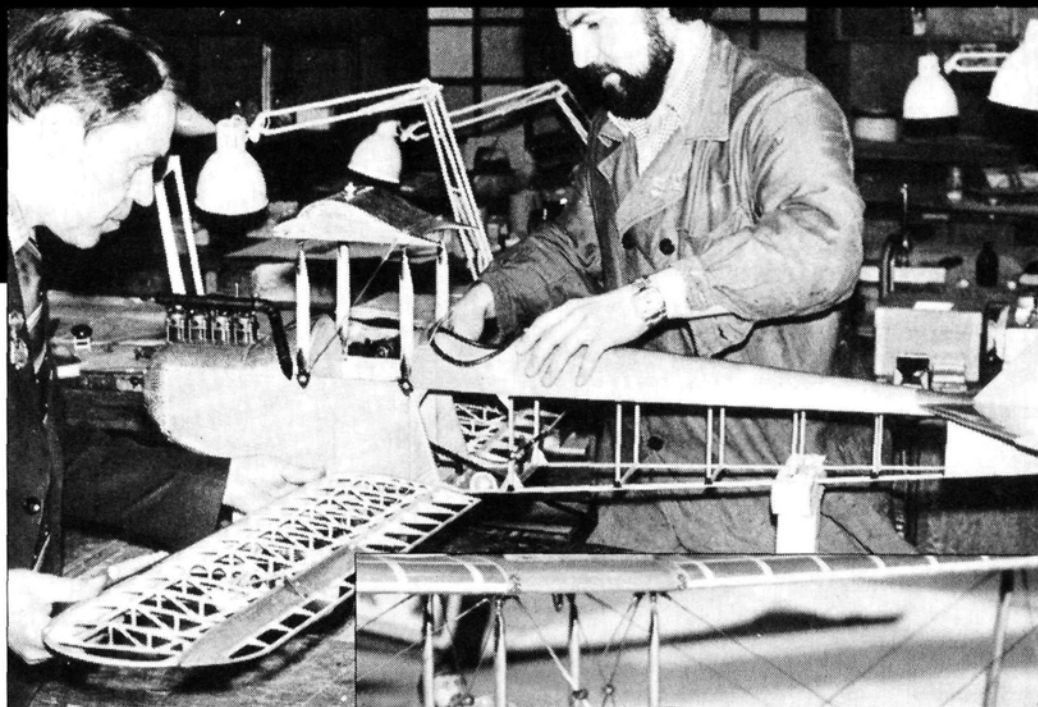
MAN, so look for more on this plane in a future issue!

● **FAI Class F3B Sporting Glider.** This competition sailplane took 2nd place in Sailplanes and Gliders. It was built by Alexey Shchegolev of Sverdlovsk, who was the Soviet Nats winner in '88, '89 and '90. The ship was designed by Shchegolev's friend, Pavel Kozimizski, for the 1991 World Championship. It's constructed primarily of fiberglass, carbon fiber and graphite. The nose pod up to the wing's leading edge is of unidirectional fiberglass cloth and polyester resin. The tube fuselage from the wing's trailing edge to the tail feathers is made of graphite and resin, and the tail surfaces are of sandwich composite construction.

Its wingspan is 2,900mm (114 inches), and the chord tapers from 240mm to

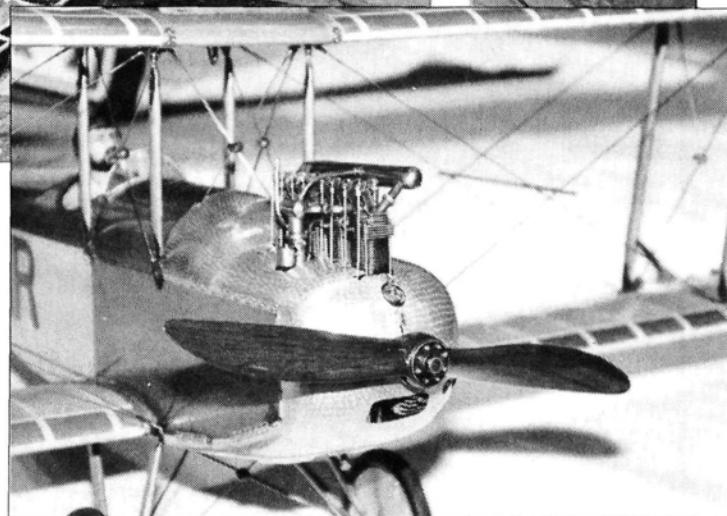
170mm (9.5 to 6.7 inches); its length is 1,470mm. The T-tailed ship has a wing loading that ranges from 38 grams per square decimeter (12.43 ounces per square foot) to 54 grams per square decimeter (17.66 ounces per square foot). A 5-channel Graupner/JR MC-18 microcomputer radio is used to control aileron, flaps, elevator and rudder, and all control techniques parallel those used in the States.

The hollow wing is of sand-



■ Above: Vladimir Bulatnikov builds the model that took Best of Show at WRAMS.

■ Right: Notice the cowl details.

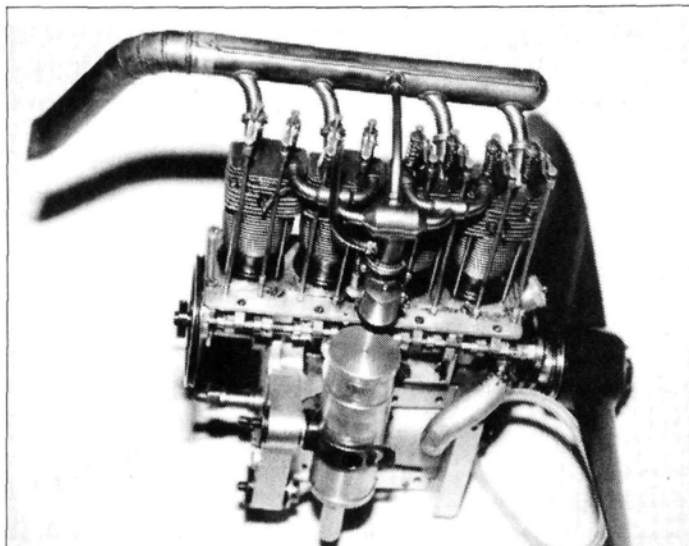


wiched composite construction that consists of unidirectional fiberglass on the outer surface, a thin layer of Styrofoam and lightweight fiberglass mat on the inside (see detail photo). The wing is finished with "nitro-paints and polished," and the wing spar measures 15x8mm and tapers toward the tip. The high-strength spar is a box structure that consists of a balsa core with laminated carbon-fiber strips on top (2.5mm thick) and bottom (2mm thick). At the tips, the carbon-fiber spars are only .5mm thick. The spar is wrapped with lightweight, resin-impregnated, unidirectional fiberglass cloth.

● **World-Record Helicopter.** Entirely scratch-built by Michail Pruss of Pechora, this fantastic testament to model-

ing ingenuity holds four F3C duration records: 1990 (5 hours, 15 minutes, 6 seconds); 1989 (5:54); 1988 (4:43:12) and 1987 (4:34:13). Everything, including gears, frames, rotor head and all components, blades, transmission bevel gears and bearings were machined by Michail. This model was a six-year building project!

The bird has a rotor diameter of 1.4 meters, with rotors made of molded plastic graphite. A large-capacity battery allows extended radio function, and various glow engines (from 6.5cc to 7.5cc) that were modified to run on gasoline are used. The black plastic frame that holds the servos and radio was machined from a plastic block and is embossed with the modeler's name and the letters

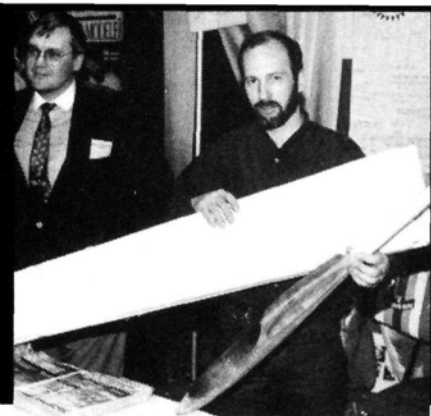


Exhaust is piped from the Webra through the cylinders of the scale Cirrus engine and out through the scale exhaust pipe. Rocker arms and valves move to realistically simulate the Cirrus.

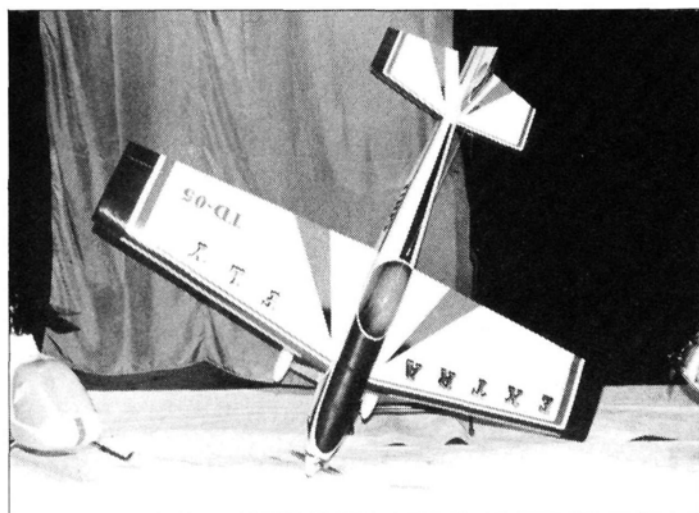




From left to right: Alexander Andrejev, Victor Fomin, Michail Pruss, Eugeny Grunin, Alexey Shchegolev, Tatiana Ryjova (translator), Howard Kuhn, Daniil Tkachenko, Alexander Gukkin (translator), Vladimir Bulatnikov and Vladimir Pershin.



Russ Pribanic shows a Soviet sailplane kit; a "Field & Bench Review" is planned. Left: Associate Editor Gerry Yarrish.



This FAI F3A-class aerobatic model was designed and assembled in 1987 by Daniil Tkachenko, repeated Soviet medalist. The model has a wingspan of 1700mm (66.9 inches), a wing area of 52 square decimeters (806 square inches), and it weighs 4,000 grams (8.82 pounds). This balsa built-up plane is covered with synthetic paint and uses a single-cylinder 4-stroke. The propeller (350x280mm or 13.8x11 inches) is made of delta wood.

"USSR." The blade holders, which are also embossed with Michail's name, were cast in handmade molds. The machine is controlled by a Futaba radio.

Michail, a radio technician for Aeroflot airlines, received

the Soviet Cosmonaut's Medal for this stupendous achievement.

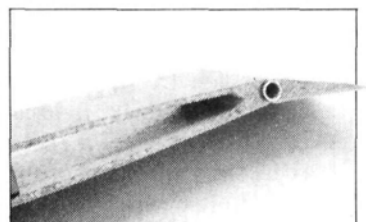
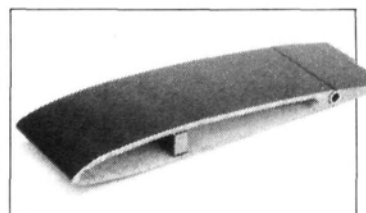
### GOODBYES

At the closing ceremony at a WRAM club meeting, gifts

were exchanged. Of special note: Albert Nazarov awarded Howard Kuhn the Diploma of the Cosmonautics Federation of the USSR (the Soviet equivalent of NASA) for fostering understanding and friendship between aerospomen.

Many people deserve thanks for making the Soviet visit a success. These include Allan Davis, Jerry Judge and Hank Nielsen; the WRAM club and its officers; Howard Kuhn; Albert Nazarov and his modeling colleagues, who took the time to travel to the U.S.; and a host of behind-the-scenes coordinators on both sides. Readers who want to contact any of the Soviet modelers mentioned in this article

can count on MAN to forward correspondence. Perhaps this will lead to further communication and visits be-



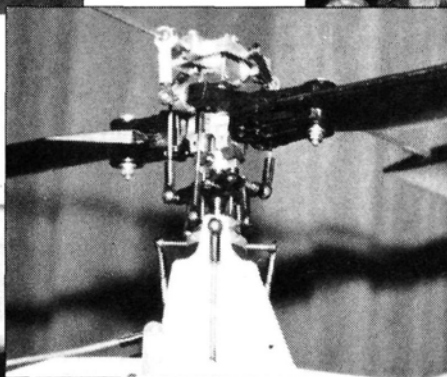
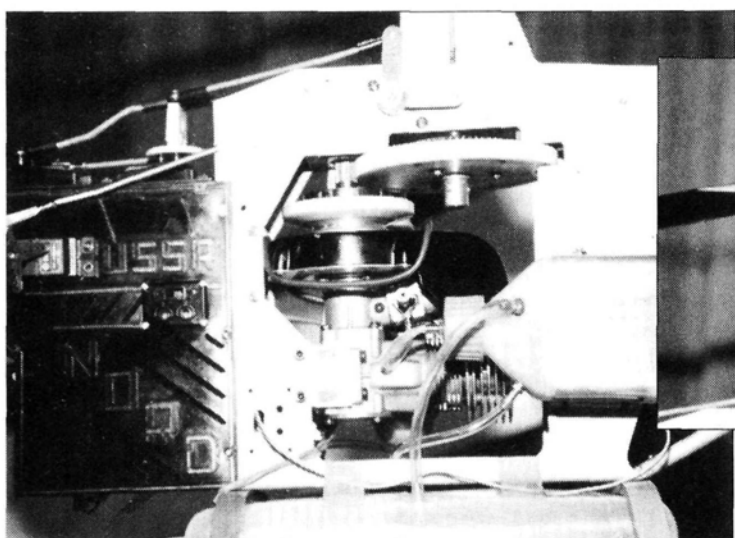
Composite construction and gapless tubular hinge show the advanced state of Soviet modeling.

tween modelers of the two countries, which would benefit all.



Albert Nazarov presents Howard Kuhn with the Diploma of the Cosmonautics Federation of the USSR for his work in fostering understanding and friendship between aerospomen.

\*Here's the address that's pertinent to this article:  
Ros-Aeroprogress, 121019, Moscow, Kalinin's Prospect, 21, USSR. (In the U.S. contact: SATRA, 645 Madison Avenue, 10th Floor, New York, NY 10022; Tel.: 212-355 3030; FAX: 212-758-6366.)



■ Left: A close-up of Michail Pruss's entirely scratch-built helicopter.  
■ Above: A detail of a scratch-built rotor head.

# E/Z FILL

## FUEL PUMP

## BENCH REVIEW

**T**HOUGH THERE are several ways of filling (and emptying) model-airplane fuel tanks, Du-Bro's\* new E/Z Fill pump and container looks like the best method yet.

From a safety standpoint, there's no model fuel container on the market that can match Du-Bro's new red plastic canister; it's thick, rigid and tough. It even meets Underwriters Laboratories' (UL) strict specifications for commercial gasoline cans. Even though the word "gasoline" is displayed in big letters on both sides, Du-Bro's container is safe for *any* model fuel: gas, glow, or diesel.

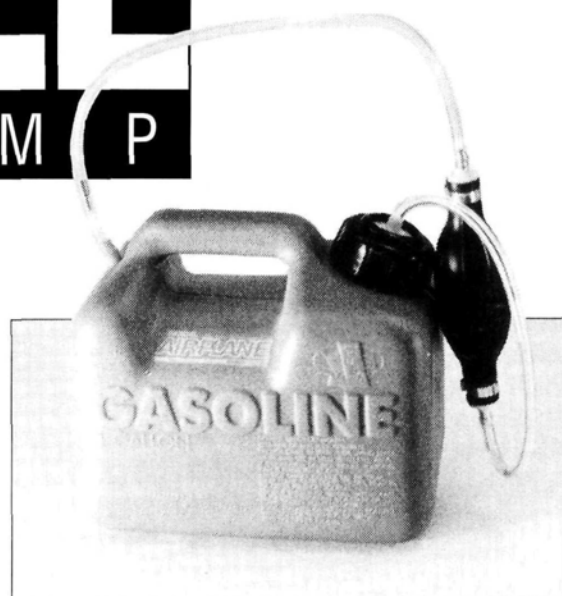
The pump part of this system consists of a synthetic rubber bulb with a fitting for plastic fuel tubes on both ends. Each fitting contains an internal ball-check valve. Once the system has been as-

sembled, you can transfer fuel from the red 1-gallon canister into your model by connecting the pump-outlet line to the airplane's filler tube in the usual way; then hold the bulb nearly vertical with its embossed arrow pointing up. Each full squeeze of the bulb will pump about 1½ ounces of fuel into your model's tank.

Emptying the tank works in exactly the same way, except that you hold the bulb vertically with the arrow pointing down so that the check valves will function properly. These balls are positioned by gravity instead of by spring tension, and that's what permits bi-directional pumping action.

Du-Bro's E/Z Fill system comes in kit form with complete, but rather brief, assembly instructions. Here are a few tips I discovered while I was putting my system together:

- Because of the way it's packaged, the plastic fuel tube can become bent and kinked. Putting it in a pot of hot water for a half hour will straighten it.
- Softening the tube ends with hot water makes them much easier to install onto the fittings. You must blow-dry the tubes after they're in place: if you don't, the steel check-valve balls could rust.
- The check valves tend to retain fuel in the bulb. Since the bulb is black, it



## SAFE AND SIMPLE

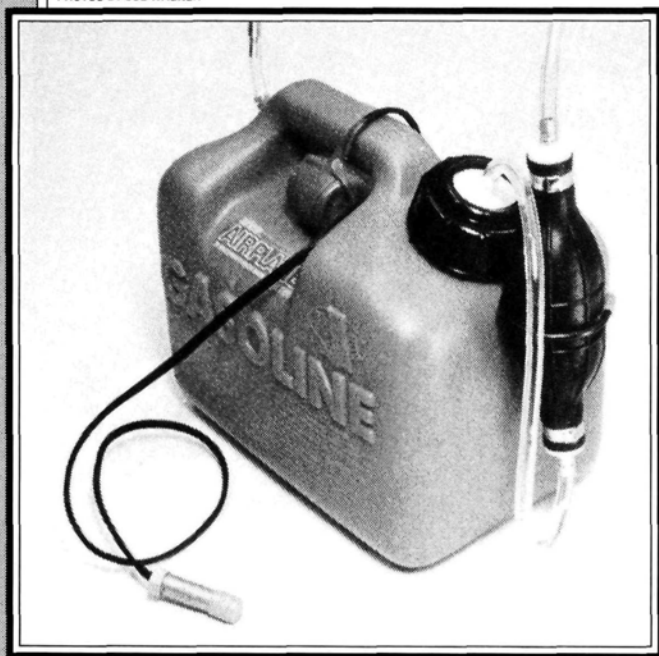
heats quickly in the sun, and the fuel inside can boil—particularly if it's diesel fuel. To empty the bulb, hold it above the container with its arrow pointing straight up, then shake the bulb sideways to dislodge the lower ball from its seat. This will permit the fuel in the bulb to drain gradually back into the container.

Du-Bro's new E/Z Fill system has everything you'll need, including a big stick-on decal for identifying the type of glow fuel that's in it; a formed wire holder to keep the bulb off the ground when it's not in use; and a filter for the internal pickup. Though Du-Bro's fill fitting is sized for models with large-diameter tubes, it's easy to adapt for fueling small engines. Just solder a short piece of small-diameter brass tube inside the end fitting. Modified this way, the E/Z Fill system still works with large fuel lines.

The E/Z Fill pump might not be perfect—but it comes closer than anything else I know of.

*\*Here's the address of the company that's featured in this article:*  
**Du-Bro Products**, 480 Bonner Rd., Wauconda, IL 60084.

PHOTOS BY JOE WAGNER



*A Ni-Cd battery, a glow-plug connector and the E/Z Fill container are all you'll need for a quick refill and restart of your "school-yard-type" R/C model. Although the container is marked "gasoline," the system works with any type of model fuel.*



# ABOUT THOSE

## ENGINES

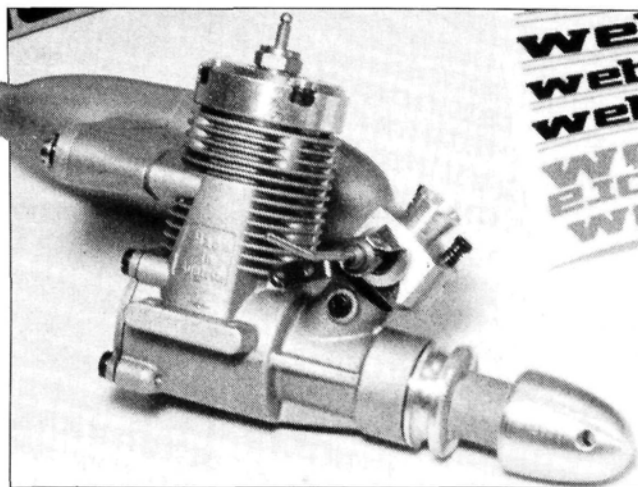
by JOE WAGNER

### Knowing your ABC's: Q & A Dept.

**O**NE THING THAT makes model airplane engines so interesting is that there's an amazing variety of them. There are engines with 2- or 4-stroke operation; glow-, spark- or diesel ignitions; single- or multi-cylinder configurations; and displacements from .006ci all the way up to chainsaw-engine size. In addition to all of these variations, engines' internal designs can differ greatly. For instance, the new ABC engines are built quite differently from the steel-cylinder ones that we've used to power our model planes for so many years.

#### ABC ENGINES

**A**n ABC engine has an aluminum piston and a brass cylinder sleeve that's chrome-plated—thus the name. Aluminum is used for the piston because it's light (it's one-third the weight of iron or steel). The piston comes to a complete stop and reverses direction twice in every revolution (at 12,000rpm, it does this 400 times each second!), and the heavier it is, the more power it needs to do this. This power is wasted in vibration instead of being used to spin the shaft. By



Made in Germany, Webra's new "Speedy" 2cc (.122ci) is one of the smallest ABC engines yet.

keeping the piston light, this unavoidable loss of energy is minimized.

A brass sleeve is used to prevent binding. When heated, brass expands as much as aluminum (i.e., roughly twice as much as steel). Thus, when combustion heats an ABC engine's piston and sleeve, they don't bind because they expand equally. The sleeve is chrome-plated to prevent wear and reduce friction. The chrome *isn't* the same as that used for decorative purposes; it's of a higher quality, and it's much more durable.

ABC engines work best with all-synthetic-lube fuel, and they run rather fast and hot. You can still touch the cylinders on some engines (e.g., the HB .15) when they run at maximum rpm, but don't try that on an ABC!

On most ABCs, the cylinder bore is slightly tapered (i.e., smaller at the top). During operation, the cyl-

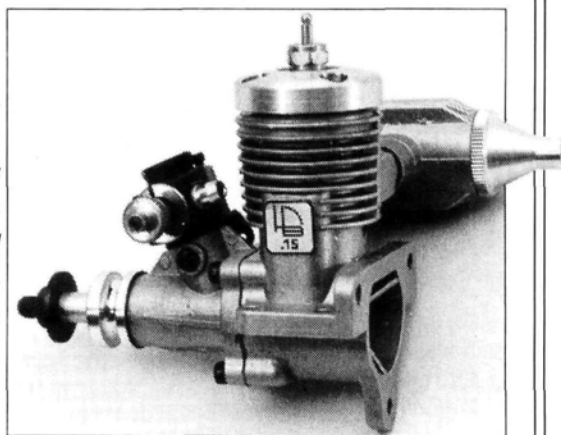
inder sleeve's head end becomes the hottest. Its diameter also expands the most. As the piston moves down, the burning fuel/air mixture begins to cool. At the same time, the area that's exposed to hot gas inside the sleeve increases. Thus, the sleeve's operating temperature and its expansion decrease from its head end to the exhaust port.

If the ABC engine has been designed and manufactured properly—and it's operated correctly—its cylinder sleeve will become

truly cylindrical from top to bottom when it warms up. The power losses that are caused by piston friction are minimal. When an ABC engine is cold, though, its piston might seem "sticky" at the top of its stroke.

Like all model engines, ABCs benefit from being "run-in," but the gradual, well-lubricated, lengthy break-in method that works well on steel-cylinder engines is all wrong for ABCs. Instead, they should be run-in quickly and at high rpm, and you should use a prop that's smaller than the one you plan to use for flight. Keep the fuel/air mixture rather rich during the first half hour or so, and *don't* add extra oil to the fuel. For the engine to perform well, the soft aluminum piston has to wear itself into a perfect fit with the hard chrome sleeve. Excess oil—especially castor!—only slows this process.

Another German-made engine, the HB .15 has a conventional design, and it runs exceptionally cool—even at full throttle.



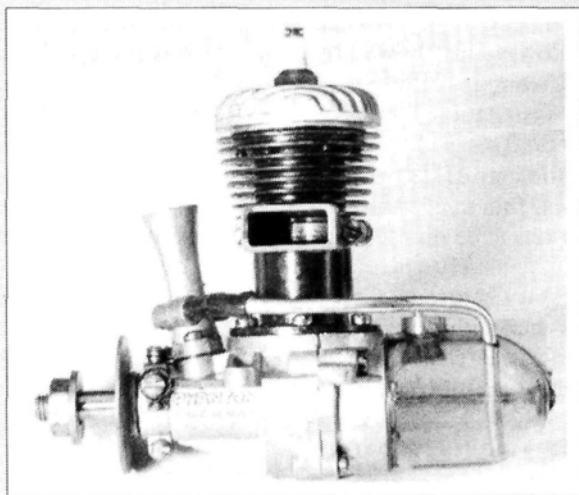
# Q&A SECTION

*I always appreciate readers' input, and I respond to every letter I receive (please include a SASE, though). I do my very best to answer all the questions thoroughly and accurately—even if it takes several pages. Sometimes, the questions are of general interest and can be answered briefly. Beginning with this issue, I'll respond to such queries in a "Question and Answer" (Q&A) section. I'd like to hear from you! Of course, I'll still respond to every letter personally, but I'll also condense and publish some of the questions and my answers in "Q&A."*

**Jerry Price of Royal Oak, MI, asks: "What exactly is Schnuerle porting? I see this term in engine ads, but I have no idea what it means."**

Schnuerle porting refers to the position and shape of the bypass ports on a 2-stroke engine. They're set up to deflect the fresh, incoming fuel/air charge inward and upward and to minimize its escape through the exhaust at the bottom of the piston stroke. This type of intake porting does the same job as the "baffle" atop the piston in a non-Schnuerle setup. The top of a Schnuerle engine's piston is usually flat, which makes it (and the cylinder head) less massive and easier to manufacture.

By the way, Schnuerle porting isn't new: the first model engine to have it (that I know of) was Bill Atwood's 1941 Phantom P-30—a .29 spark-ignition engine.



**This 1941 Phantom P-30 was the first Schnuerle-type model engine on the market.**

**L. F. Randolph of Dallas, TX, discovered something odd: "Just to see what would happen, I put a .15-size carb on my Enya 11-CX. The engine performed better, but I expected the fuel suction to decrease because of the carb's larger throat diameter. Instead, the suction increased noticeably! Why?"**

The velocity of the air flow through a 2-stroke engine's venturi depends on the difference between the atmospheric pressure (14.7 psi) and the pressure inside the crankcase when the inlet port opens. The greater the difference in pressure, the faster the



**This Enya 11-CX's performance improved in every way after its owner replaced the stock carb with a .15-size carb.**

inflow—up to a point! If the pressure differential is too great, the air flow will be turbulent and erratic. Maximum air flow through a smooth, unobstructed bell-mouth intake occurs when the crankcase pressure is about 8.3 psi (i.e., 6.4 psi less than atmospheric pressure). Inlets with smaller diameters can't handle pressure differentials greater than 6.4 psi, and the result is a reduced incoming flow.

Model-engine intakes are generally far from smooth and unobstructed; and few have a truly bell-mouth shape. A typical model-engine carb, with its abrupt changes of flow-path cross section, probably reaches the critical airflow point with a vacuum of 5 psi or less.

It's likely that the original carb on Mr. Randolph's Enya 11-CX had an inside diameter (i.d.) that was too small. The air that flowed through the carb was so turbulent that it couldn't provide enough fuel/air mixture for optimum power output or maximum suction at the needle-valve orifice. When he used a carb with a larger i.d., the airflow volume was increased substantially, while the turbulence was greatly reduced.

Why didn't Enya use a carb with a diameter of the proper size in the first place?—because it's very difficult to measure pressure differentials across small venturis. Years ago, while I was an aerospace engineer, I designed some small "cold" rocket engines that could be used to control the attitude of reconnaissance satellites. It took far more time, ingenuity and expense to accurately measure the gas pressure and flow through the nozzles than it did to design and build the engine itself! ■



# SMALL STEPS

## ELECTRIC POWER FOR SMALL-STEPPERS

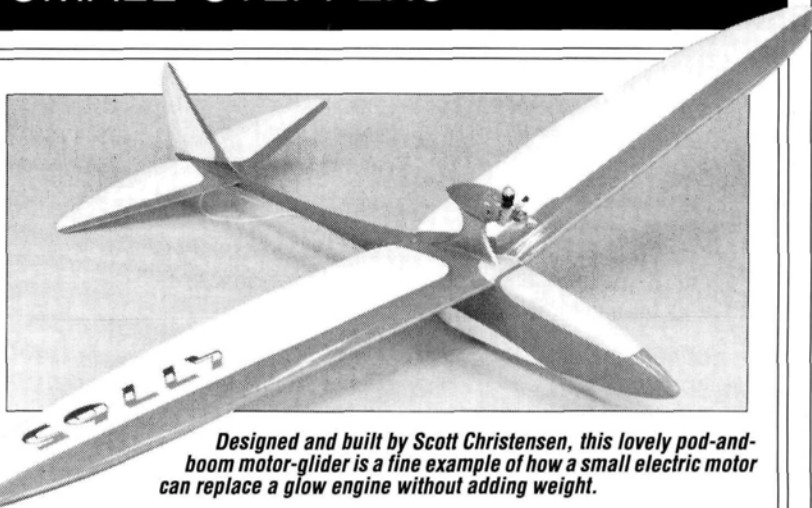
by JOE WAGNER

**S**INCE THIS COLUMN began almost five years ago, Randy and I have written mainly about R/C airplanes that are powered by glow engines with displacements of less than .25; i.e., those substantially smaller than the .40-and-up engines that many fliers favor. Now it's becoming obvious that electric power is swiftly gaining in popu-

larity and performance. Most electric fliers use .05-size or larger motors. As with liquid-fuel engines, however, small motors have advantages over their larger counterparts.

### WEIGHT WORRIES

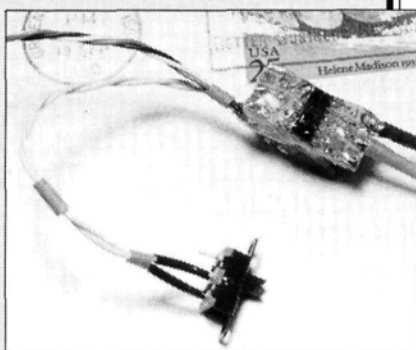
**W**eight is the main problem with electric-



*Designed and built by Scott Christensen, this lovely pod-and-boom motor-glider is a fine example of how a small electric motor can replace a glow engine without adding weight.*

### PROPORTIONAL CONTROL?

Even on electric R/C airplanes that have small motors, it's good to have a proportional speed controller. True, many topnotch fliers (Bob Aberle for one) get along nicely with a simple on/off motor switch. With a proportional controller, however, you



*It's not much to look at, but RJM Systems' tiny PT-06-A electronic throttle provides proportional motor speed from zero to full-power. With 99-percent-plus efficiency, it doesn't need a heat sink.*

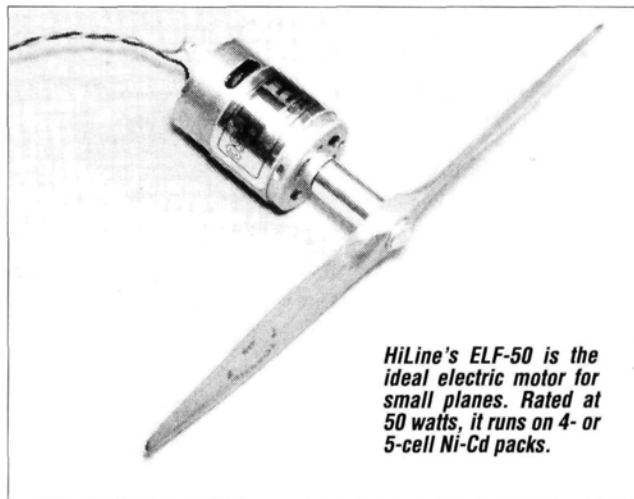
can set the motor power at exactly the point that's necessary for level cruising. That lets you keep your schoolyard R/C model at a constant altitude throughout its flight—low enough so you can see the airplane clearly and admire its realistic performance.

There are several mini speed controllers on the market for electric R/C airplanes. One of the best is RJM Systems'\* PT-06-A. The size of a postage stamp, it weighs a mere 12 grams, and it has such a negligible voltage drop that it doesn't need a heat sink. Rated at 75 watts continuous duty, the RJM PT-06-A makes a perfect companion for HiLine's ELF-50 motor.

powered planes. If you use small motors, though, this problem isn't so bad—sometimes it doesn't even exist! For example, take a 300-square-inch, 3-channel R/C model. With a typical .10 glow engine, the weight of the complete power and R/C installation totals 18 ounces. This includes the engine, muffler, prop, mount, fuel tank and fuel, receiver, three miniservos, 275mAh battery and all the necessary hardware. Compare that with an electric setup in the same aircraft that has a HiLine\* ELF-50

motor, five 800mAh Ni-Cds, a Futaba\* Attack 4 radio with two microservos and a built-in electronic speed controller. With all the wiring and mounting hardware, the airborne power-and-control system weighs a mere 13 ounces!

It's true that the .10 glow engine puts out far more power than the ELF-50 and, with a 2-ounce (or larger) fuel tank, it runs considerably longer. For schoolyard-type R/C flying, however, you don't really need a great deal of power. About the only time full throttle is



*HiLine's ELF-50 is the ideal electric motor for small planes. Rated at 50 watts, it runs on 4- or 5-cell Ni-Cd packs.*



## FANCY FIELD BOX

One inconvenience that's associated with flying electric R/C airplanes is that it ties you to an automobile. A car battery is commonly used to recharge Ni-Cd battery packs. Small electric-plane fliers, however, can employ a much handier setup. I've designed and built a special field box that has everything I need for school-yard electric R/C.

My field box includes a pair of 6V 10Ah gell cells for recharging the plane's battery pack and the R/C transmitter. I built in the operating panel from an older AstroFlight\* 6/7-cell charger and

FFC (Fast Field Charger) for my R/C-system batteries; an expanded-scale voltmeter and a digital mini-multimeter; tools; spare props; charging cables; and one of Zap's\* neat new Crash Kit field-repair packages. A shelf at each end of the box holds a transmitter.



*My field box's drawers are shorter than the box's overall depth so there's space for charger-panel components in the rear. The drawer bottoms are lined with thick felt to protect the contents.*

modified it with coaxial-type power jacks to eliminate dangling wires. A panel-type Radio Shack voltmeter constantly displays the status of the gell cells. (Their voltage is an excellent indication of the remaining amp capacity.)

My field box also has a top tray and three drawers, in which I carry an Ace\*



*The "electricity" side of the portable field box has a voltmeter, Ni-Cds, a charge panel and decals galore. The box is made of 3/16-inch luaun plywood, and inside it there's a 12V, 10Ah gell cell.*

Fully loaded, my electric-power field box weighs about 20 pounds. That's less than most engine-type boxes, with their motorcycle batteries, electric starters, 1-gallon fuel cans and pumps, and power panels. Mine is smaller, too; just the right size for me.

With an airplane in one hand and my field box in the other, I can walk a few blocks to the local football field and have fun, fun, fun with my quiet little R/C plane. The built-in gell cells have enough capacity for a dozen flights of Ni-Cd recharges, and that's plenty to pleasantly while away a summer evening!

applied to a .10 glow-powered sport plane is during takeoff. You can hand-launch electric planes, or you can bring some carpet to make a temporary "paved" runway.

Another type of R/C model in which electric power doesn't add weight is the motor-glider—particularly the kind that has

its motor mounted on a pod above the wing. You always need nose weight in this configuration to bring the CG into its proper place. Replace the glow engine with a motor and that lifeless lead ballast with a Ni-Cd battery pack, and you can enjoy silent flight during climbing and gliding.

*\*Here are the addresses of the companies mentioned in this article:*

**HiLine, Ltd.,** P.O. Box 1283, Bethesda, MD 20827.

**Futaba Corp. of America,** 4 Studebaker, Irvine, CA 92718.

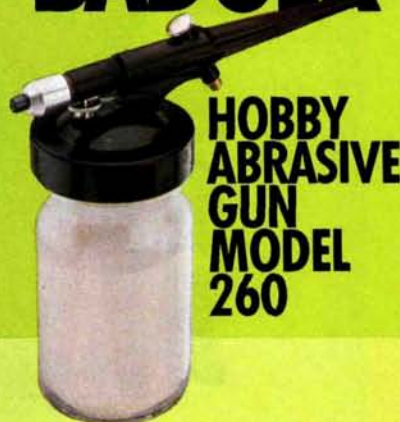
**RJM Systems, Unit #3,** Sandy Hill Rd., RD 6, Irwin, PA 15642.

**AstroFlight, Inc.,** 13311 Beach Ave. Marina Del Rey, CA 90292.

**Ace R/C, Inc.,** 116 W. 19th St., Box 511C, Higginsville, MO 64037.

**Zap; distributed by Frank Tiano Enterprises,** 15300 Estancia Ln., W. Palm Beach, FL 33414. ■

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**HOBBY ABRASIVE GUN MODEL 260**

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- Jewelry Refurbishing
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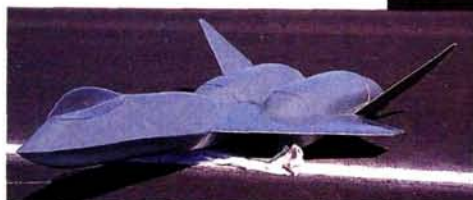
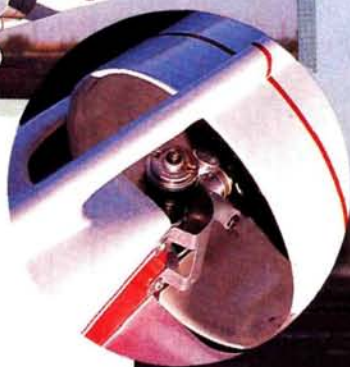
ADVANCED COURSES, COVERING HELICOPTERS, DUCTED-FAN, AND AEROBATIC FLYING!



# Speed Over Spook Hill



■ Top: Dave Reichart's MiG just before touchdown.  
 ■ Above: Jerry Vilendrer's 74mph Cox-powered fan trainer (built from MAN plans). ■ Right (inset): A close-up of the Cox engine in Jerry Vilendrer's fan trainer.  
 ■ Below: Michele Boland's YF-23 will have flown by the time you read this.



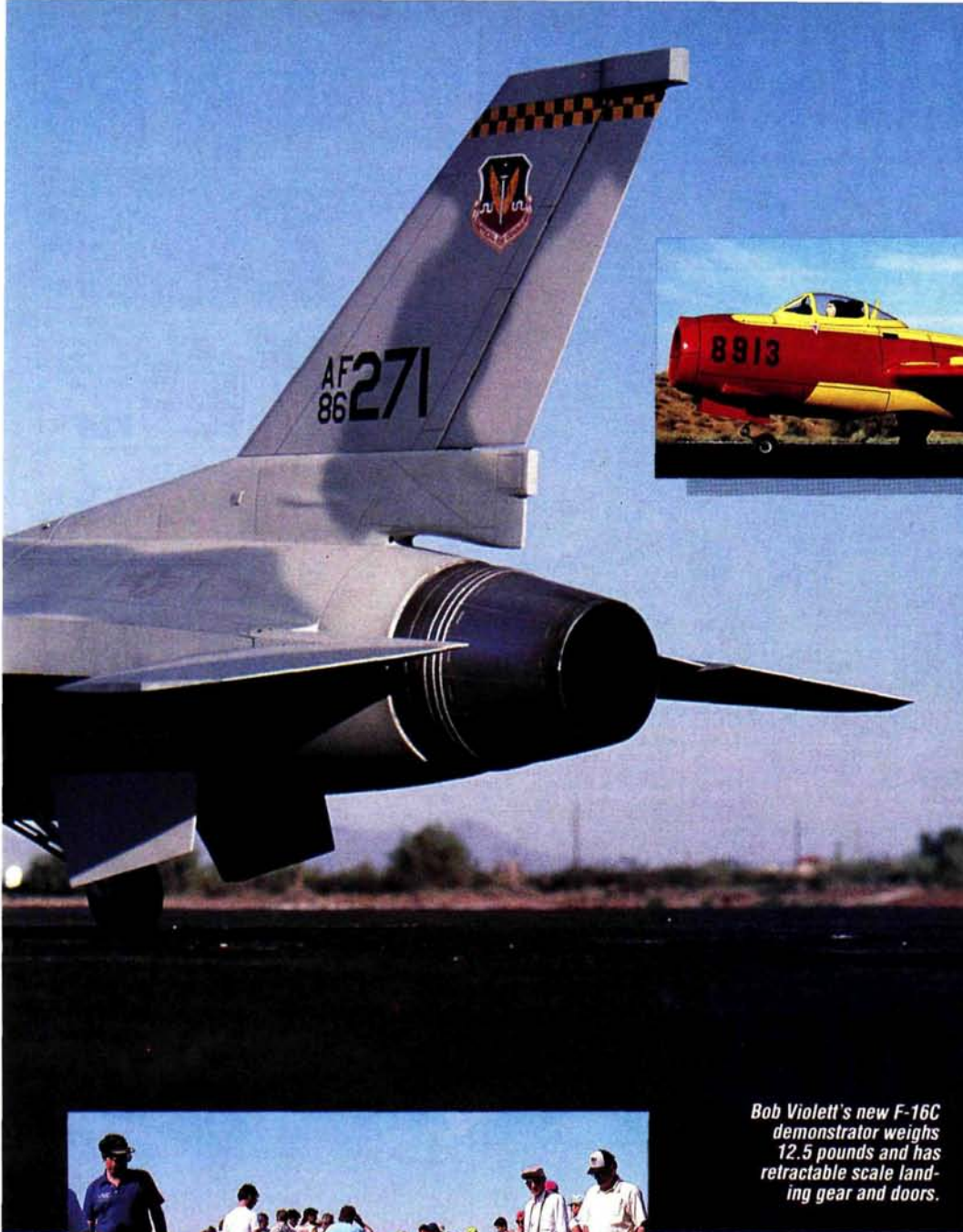
## 2ND ANNUAL ARIZONA JET



■ Above: Bob Ruff's Jet Hawk ARF trainer is available from Thorpe Engineering. ■ Right: Dorian Anderson's colorful F-86 Sabre.







■ Above: Dave Reichart's MIG 15 in the training colors of Pakistan. ■ Below: Steven Cantrell shows us the underside of his F-86F Sabre. ■ Below left: The mid-day lineup of ducted-fan models.



PHOTOS BY STEVE GURLEY



Bob Violet's new F-16C demonstrator weighs 12.5 pounds and has retractable scale landing gear and doors.

# RALLY

by STEVE GURLEY

**D**URING NOVEMBER, when most of the fliers in the northern part of the country are putting away their planes and setting up for their winter building projects, fliers down south are just starting their winter flying. Summers in Arizona can be

brutal, with daytime temperatures breaking the 120-degree mark and "cool" nights of around 100. It's not much fun to fly when the ramp temperatures exceed 168 degrees, as was the case during our Warbird Race in September. During the

weekend of November 18 and 19, however, when the Arizona Model Aviators held their second annual Jet Rally, the weather was kinder. The 46 pilots (with 65 airplanes) and the 47 sponsors who signed up broke the attendance record.



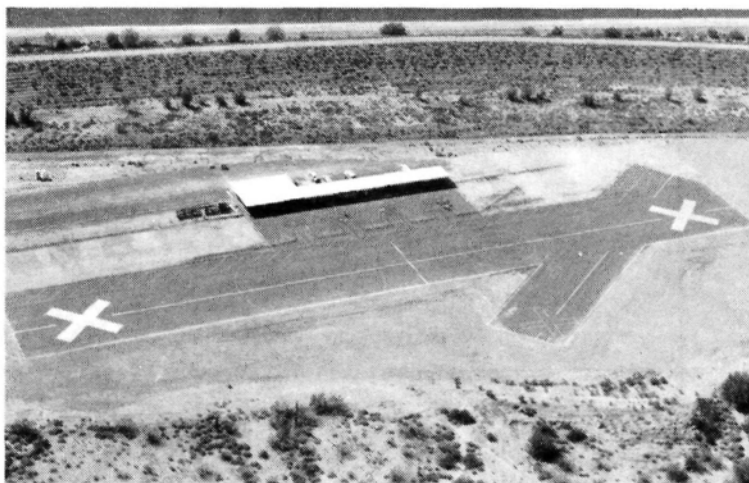
## WHAT A VARIETY!

It was ideal ducted-fan flying weather: midday temperatures of a comfortable 85 degrees, almost no humidity and a light breeze. The paved runway at Spook Hill is 650 feet long and about 85 feet wide, and there's a cross runway for our famous cross-runway winds. The slowest plane didn't have enough thrust to take off, and the fastest plane was clocked at 200mph.

Prizes were awarded in seven categories (see the winners' chart), and there were some unusual planes among the entries. We're all used to seeing Vipers, Skyhawks, F-86s, F-16s, FA18s, F-15s, Enforcers and Predators, but how many fan trainers do you usually see at this kind of event?

Several trainers showed up, and one of the most interesting was Jerry Vilendrer's fan trainer jet that weighs 2 pounds or less and is powered by a .049 Cox engine. This pusher engine was fitted with a little Cox three-blade prop that pushed the plane along at a top speed of 74mph. Jerry uses 50-percent-nitro fuel in the stock .049, and the plane takes off with a roll-out of approximately 250 feet. The 5-inch prop has a 3.5-inch pitch, and Jerry had reduced its diameter to 4<sup>3</sup>/<sub>8</sub> inches.

Robert Grenga brought the other fan trainer, which he had built from MAN plans. This beautiful little plane weighs only 24 ounces and has a wingspan of 30



## ARIZONA JET RALLY

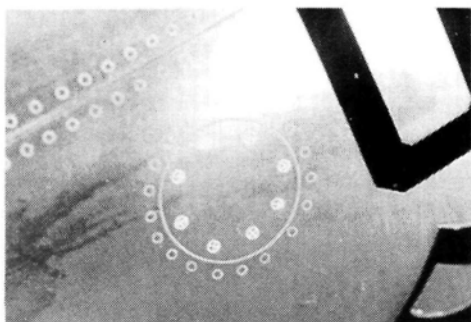
two-day rally, and it's the first true, ARF, all-wood, ducted-fan trainer. Called a "Jet Hawk," it's sold by Thorpe Engineering Corp. in Mesa, AZ.

There were a few other unusual fan jets at this event: Bill Wendt of Lake Havasu City, AZ, brought his Sport Mirage, which he scratch-built from his own plans. This delta-wing beauty has a wingspan of 48 inches, weighs 10 pounds and is powered by a Byron fan that's driven by

an O.S. 91DF. It's made of balsa that's covered with Ultracote, and it has flown about 40 times. Michelle Boland's Northrup/McDonnell Douglas YF-23 44-inch-span Stealth will have a finished weight of about 15 pounds and will be powered by two Rossi 81s driving Byron fans. Michelle races warbirds and says this bird will be flying before the year is out.

Bob Violett demonstrated his new F-16C. It weighs in at 12.5 pounds and is powered by a KBV82 fan package. Its special features include fiberglass and fiber composite construction and scale landing gear that, when retracted, are hidden.

Some of the kit's foam packaging forms a template that allows you to align the horizontal fin to obtain the correct incidence and anhedral easily and accurately. This has to be the best-engineered ducted-fan kit; no detail has been overlooked to en-



*A low-angle shot of Ron Gilman's F-86F Sabre with a close-up of the details.*

This aspect of the hobby is attracting more and more participants. There are an estimated 2,500 ducted-fan fliers in the country, and they make up a small part of the AMA membership. True fan-trainer aircraft are few and far between, and more are needed to encourage people to give it a try.

inches. The only ARF jet at the meet was so much of a trainer that lines constantly formed behind the pilot, because everyone wanted a turn. The Jet Rally CD, Bob Ruff, brought a conventional high-wing trainer with a Turbax fan powered by a K&B 7.5 engine. This model flew many flights during the



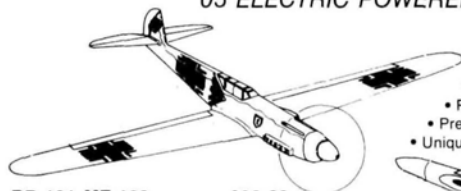
**TRICK SCALE**

**RC ARFS**

## Dicky bird models

### BATTLE OF BRITAIN WARBIRDS

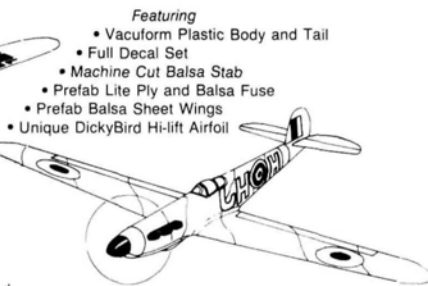
05 ELECTRIC POWERED SAILPLANES



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Length..... 34 inches  
Wing Area..... 420 sq. inches  
Weight..... 44 oz. (Powered)  
27 oz. (Glider)

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DB-102 Spitfire.....\$98.00

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  - Machine Cut Balsa Stab
  - Prefab Lite Ply and Balsa Fuse
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### CLASSIC GLIDERS OF THE 1930's

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# ARIZONA JET RALLY

## WINNERS

### People's Choice

Scale: Ron Gilman

F-86F Sabre

Non-scale: Garry Kutzman  
Viper

### Best McDonnell Douglas Jet

Austin Goodwin

A-4 Skyhawk

### Best Twin Jet

Harry Wood

Cessna Citation

### Technical Achievement

Ron Gilman

F-86F Sabre

### Fastest Jet (200mph)

Kent Nogoy

Viper

### Best Scale Flight

Dennis Coates

F-8 Crusader

### Best Flame-Out

George Miller

F-4 Phantom

sure success in its construction.

Awards worth more than \$5,000 were presented, and pilots were given goodies. Prizes included airplane kits, radios, engines and fans, and all sorts of parts and tools. Next year's event is already being planned by a number of modelers who want to get in on the action! Terry Voirin did an excellent job of describing the aircraft's features, and he kept the pace going when many of the pilots wanted to swap lies, instead of fly—and fly they did! At half time, we were entertained by the Arizona Flying Eagles show team.

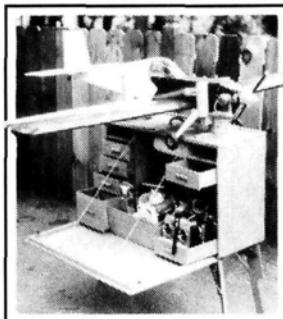
This might not be the *biggest* jet rally, but the variety of aircraft, the half-time air show and the organization that ensure *lots* of flights for everyone, definitely make it one of the *best*.

## THE EAGLE'S LAIR

The Eagle's Lair is built with fliers in mind by men who fly, and it enables hobbyists or professional fliers to bring their shops to the field. It's made of the finest red oak hardwood and red oak plywood with brass hardware. A light oak stain and a polyurethane finish make the Lair a tough competitor. Measuring 31 1/2 x 11 1/2 x 19 1/2 with adjustable folding legs, foam-covered fuselage holders and a removable flight tray, the Eagle's Lair is the only flight box you'll ever need.

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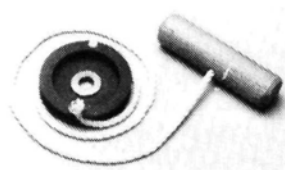
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These are the reasons why "BLUE LINE" Silicone Tubing is #1 on the market today.

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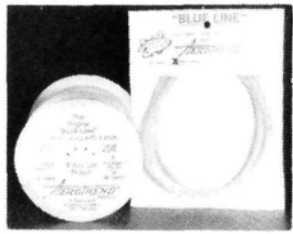
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- It's lightweight—can be carried in your pocket.
- A size for all engines.
- Maintenance-free!

AEROSTART will fit behind a .142 or smaller engine drive flange. For large size, installation would be in front of the propeller.



## QUIET FLIGHT

(Continued from page 21)

portant as my radio! Now I know that if I ever have to yell those fateful words, "I don't have it!" it won't be because my batteries are low. I also know that when someone calls to say, "Let's hit the slope; the wind is great," I'll be ready to go. For \$65, this field charger is cheap insurance against the loss of a model!

Next month, I'll show some readers' planes and touch on the subject of whether or not glider skids are becoming dangerous. Till then...good thermals and a full charge!

\*Here's the address of the company mentioned in this article:

**KO Propo;** distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

## SPORTY SCALE

(Continued from page 23)

and, to sweeten the pie, this model can easily be documented in many, many color schemes other than just aluminum! You can start looking for this new kit around August. Oh, I almost forgot to mention what this new bird is: it's the famous old Lockheed T-33 T-Bird. Straight wings, plenty of dihedral, simple flaps and landing gear, plus lots of wing area ensure it will be in great demand. You already know the degree of fabrication and completeness offered in any kits produced by Bob Violett Models, so we think this T-33 will be as much of a winner as the rest of Bob's line.

Thanks for sharing some of that precious building time with me this month. By now, Top Gun will be history and Major Tom will probably be working on his in-depth report as you are reading this. Until next time, keep those cards and letters coming, don't forget to wipe your feet and keep checkin' that six.

\*Here are the addresses of the manufacturers mention in this article:

**Florence Hobby Center**, 420 W. S.R. 434, Winter Springs, FL 32708.

**Bob Violett Models**, 1373 Citrus Rd., Winter Springs, FL 32708.

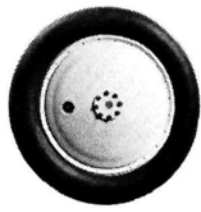
**Jet Model Products**, 304 Silvertop, Raymore, MO 64083.



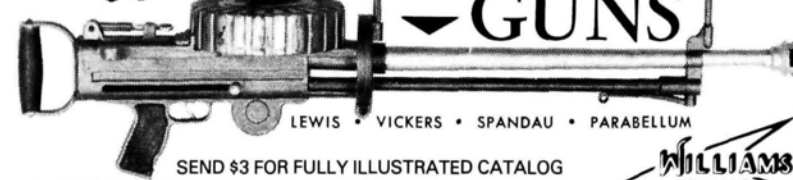
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<input type="checkbox"/> CALIF. TAX 7.25%.....		• BALSA & PLY (DOOR SKIN)
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<b>TOTAL \$</b> .....		
<input type="checkbox"/> BROCHURE.....	N.C.	

SEND TO: FUN SCALE  
993C-184 S. SANTA FE, VISTA, CA 92083  
Phone: (619) 726-0154

## FLOATING AROUND

(Continued from page 44)

floats and sent them to 93-year-old Punch Dickens, who flew the original Fokker in 1928! I see pictures of flying sites from Canada, Alaska, Florida—all over, really—and I hope that you're taking advantage of them. Float flying is a blast!

The final photo comes from Charlie McCracken in Poway, CA, who flies with the Lake Poway Skimmers out in the California desert, where clear skies and blue water are common. His Kadet Senior has 44-inch floats (like Marvin's SK), and it weighs 11 pounds with an O.S. .61 4-stroke and 1200mA batteries. It's flawlessly finished in red and white, and the stab "finlets" really make a striking addition to the tail group. Floatplanes have increased frontal area, and in many cases, they really benefit from increases of up to 20 percent in the fin area. If you have a floatplane that's twitchy on takeoff or squirrely in flight, try this solution. I've never seen it do any harm.

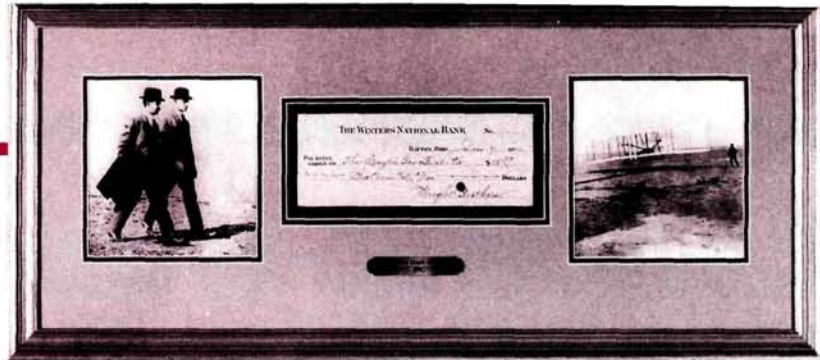
## A PASSING

I end this month's column on a sad note. Morris Curry, a founding member of the Clearlake Renegades, died on December 19, 1990. Mo was a big, gentle man, who served several terms as councilman, and later as mayor, for the City of Lakeport.

If you were to trace the genealogy of model float flying's success and acceptance, the path would lead to Clearlake and Mo Curry, Art Young, Wally Rinker, Bill Gresham and Dick Hershey. Other meets may have existed as long as Clearlake, but fate selected this one to be noticed, and the Renegades (and later the Clearlake Modelers) did a tremendous job of running the show.

This year's Clearlake Meet will be held

(Continued on page 73)



## WRIGHT BROTHERS

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CONSOLIDATED PB5A CATALINA 81" SPAN \$269.95  
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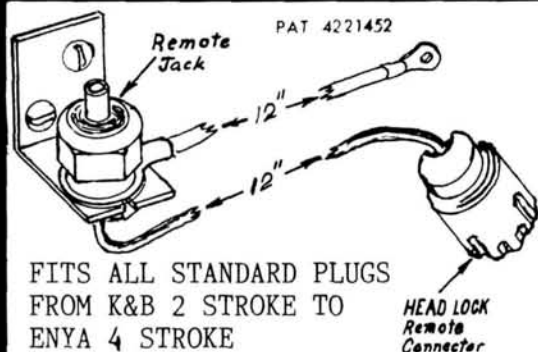


GRUMMAN ALBATROSS HU-16B 81" SPAN \$269.95



CANADAIR CL-215 81" SPAN \$259.95

All models use .40 2C engines and feature a fiberglass fuselage with pre-joined halves. The kits include vacu-formed cowls and nacelles. The wings and empennage are made of small-bead, low-density foam and are pre-slotted for the spars. The kits feature pre-sawn spars, and all wood is included to build the planes. Retractable landing-gear kits are available for the Canadair and the Albatross. The 120-minute video covers building and flying. The kit comes with a 35-page construction manual with step-by-step instructions and detail drawings. Retractable landing-gear kit \$179.95; Video \$24.95. G&P Sales 410 College Ave., Angwin CA 94508 (707) 965-3866 CA Residents add 6.25% sales tax. Please send \$1.00 for information sheet.



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## "HEAD LOCK" REMOTE

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by JOE LACHOWSKI

**T**HE EXTRA 300 is one of the latest in Hobbico's\* ASAP Series, which—as the name implies—is designed to get you flying as soon as possible. The Extra 300 is a sport-scale model of the German-designed, two-seat, aerobatic airplane that's seen in world-class aerobatic competition. Only a limited number of full-scale Extra 300s exist.

### THE KIT

The Extra 300 kit is almost complete; you only have to provide a radio, an engine, adhesives, a prop, fuel line and a fuel filter. The major airframe components come in clear plastic bags that are separated by cardboard dividers. The hardware is also bagged and neatly packed.

There are only a few major components—fuselage, wing halves, stab/elevator assembly, fin and rudder—and they're built and finished for you. Except for the fin, the control surfaces come permanently hinged; you hinge the rudder and fin together when assembling the tail. Also provided are a fuel tank, engine mount, cowl, landing gear, wheels, wheel pants, spinner, decals, control linkages and all the hardware needed to complete the airframe.

H O B B I C O   A S A P

# Extra 300



ARF aerobat!

# Extra 300

The 28-page instruction manual contains more than 130 assembly photos and illustrations, a parts list, general information on safety and engine operation, and basic flight instructions.

I looked the kit over carefully before starting assembly. The fuselage, wings and tail surfaces all seemed to be straight and undamaged. I only had to trim one aileron and work it back and forth for smooth, easy deflection. I didn't find any poor glue joints, but if you do, a thick CA fillet will probably be all that's needed to fix it.

Assembling the Extra 300 is similar to assembling most balsa, ply and foam-skin ARFs. You must install the wing, landing gear, engine and radio, tail, cowl and, finally, the canopy. Two adhesives are required—30-minute epoxy and CA glue. I chose Satellite City's\* Hot Stuff UFO, because it doesn't attack foam.

To get my Extra 300 airborne as quickly as possible, I skipped around in the instruction manual and assembled or installed items out of sequence. While the wing was set aside for the epoxy to cure, I assembled or installed the servo tray, servos, wing-mounting block, cowl-mounting braces, landing gear, fuel tank, cowl and pushrods.

I made only a few minor changes. First, I replace the supplied threaded pushrods with 2/56 threaded rods so that I could use Sullivan\* Gold-N-Clevises, which I prefer to the nylon clevises provided in the kit. Second, I glued strips of 2-ounce fiberglass cloth along the seams of the assembled four-piece cowl. This strengthens the structure and ensures that it will stay together. For a good fit, assemble the cowl carefully; an extra pair of hands would

definitely help! From start to finish, it took me approximately 16 hours to prepare the Extra 300 for flight.

## ENGINE AND RADIO

For power, I chose the recommended O.S.\* 70 Surpass and an APC\* 12x8 prop. (The



*The finished plane has a sharp profile.*

12x8 is one of the prop sizes that O.S. recommends for aerobatics with its 70 Surpass.) Out of the box, the engine turned a quiet 10,000rpm; after it has been broken-in, it should turn even faster.

A 4-channel radio is all you really need, but I chose a Futaba\* 7UAF 7-channel radio, because I wanted to take advantage of its exponential control and ATV (adjustable travel volume). The exponential allows you to "soften" the

## SPECIFICATIONS

Type .....	Aerobatic sport scale
Wingspan .....	55 3/4 inches
Wing Area .....	543 square inches
Wing Loading .....	25.2 ounces per square foot
Length .....	42 1/2 inches
Weight .....	5 pounds, 15 ounces (ready to fly)
Power Req'd ...	.40 to .45 2-stroke; .60 to .90 4-stroke
No. of Channels Required .....	4 (elevator, ailerons, rudder, throttle)
Sug. Retail Price .....	\$259.95

**Features:** the Extra 300 comes 80-percent assembled with hinged control surfaces and all the necessary hardware. Made of lightweight balsa, ply and foam skin, it has a

semi-scale appearance.

**Comments:** the Extra 300 is a sharp-looking, very aerobatic aircraft for experienced fliers, who will enjoy testing their skills with it.

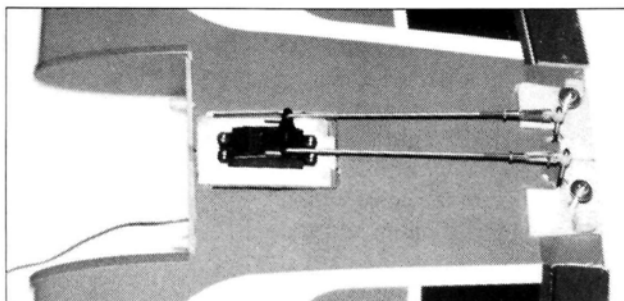
breeze to set the right amount of control-surface deflection.

As a starting point, I set the elevator and ailerons to the recommended deflections with -28 percent exponential, and I set the rudder to the maximum possible deflection. Eventually, I had -32 percent exponential on the elevator and ailerons.

## THE FINAL STEPS

No finishing is required; after all, this is an ARF! A few decals and trim tape, and you're ready to go!

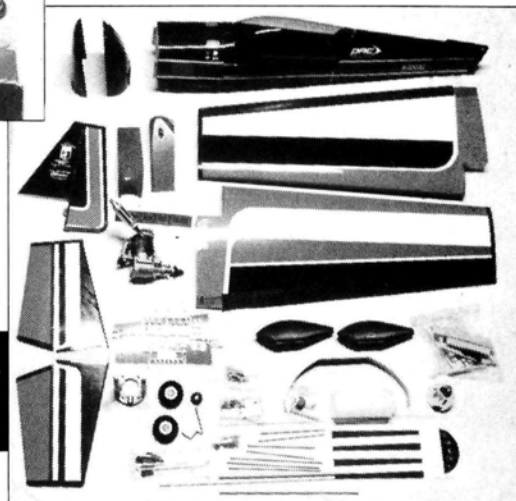
My Extra 300 weighs 5 pounds, 15



*The kit includes die-cut servo trays.*

response around neutral, and this makes the aircraft more manageable and smoother in flight. The ATV limits servo travel and makes it a

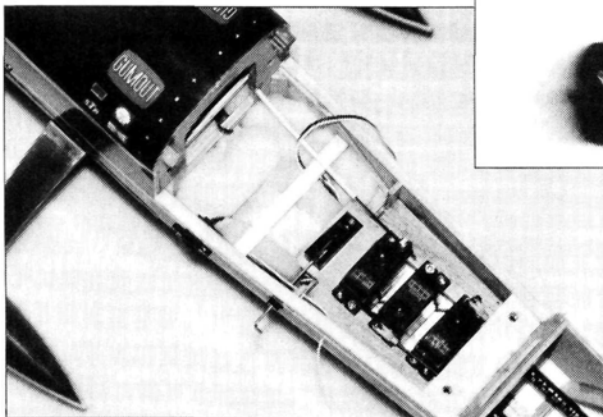
*These completed subassemblies are the reason why this is called an ASAP kit. The O.S. 70 Surpass engine isn't included.*





# Extra

# 300



▲ The fuselage comes built and finished. The canopy is joined to the fuselage section that forms part of the wing saddle.

◀ Radio installation: the foam-packed receiver goes in front of the on/off switch. The receiver battery pack goes under the fuel tank against the firewall.

ounces for a wing loading of 25.2 ounces per square foot, which is within the specified range. With the 500mA flight pack pushed against the firewall, the plane balanced right on the CG that's marked on the side of the fuselage. If you install a 2-stroke engine, you'll probably have to add nose weight. The total, ready-to-fly cost of my Extra 300, without the radio, was about \$425.

## FLYING

After running-in the new 70 Surpass with a couple of tanks of fuel on the ground, it was time to take to the air. First, I taxied the Extra 300 around on a landing strip of short grass to see how it handled. I had no problems, but on long grass, you might have to remove the wheel pants or use larger wheels.

Takeoff was just as pleasing: under the power of the 70 Surpass, the Extra 300 was easily airborne within 30 feet. I did only minimal trimming; a few clicks of up-elevator and right aileron trim were all that was needed for straight, level flight.

Next, I put the Extra 300 through some basic aerobatics. It tracked straight and effortlessly through loops and had respectable vertical performance. The 70 Surpass and APC 12x8 seemed to be just the right engine and prop combination. I kept the air speed up, and the first landing went off without a hitch.

On the next few flights, I tried every maneuver I could think of to check the plane's tendency to stall. Even a relatively slow landing approach shouldn't be a problem; I brought the Extra 300 virtually to a stop be-

fore it stalled and fell to the right. Just remember: using a little throttle will almost guarantee a good landing every time. I must have put the Extra 300 through 20 or 30 aerobatic maneuvers, and it did most of them quite well. It "knife-edged" surprisingly well and stopped on a dime after a snap roll in an avalanche.

I also flew the Extra 300 without using exponential. This is a piece of cake with the Futaba 7UAF: simply flip the elevator, rudder and aileron switches to the high-rate position, and program in 0-percent exponential. If you don't have the luxury of a high-tech radio, don't worry; using the recommended control-surface deflections, the Extra 300 flew well without exponential.

## OVERVIEW

The quality of the Extra 300 kit is on a par with that of most balsa, ply and foam-skin ARFs, and its assembly is straightforward. In addition to the construction changes I mentioned, you

might consider the use of larger canopy mounting blocks, and blind nuts and bolts instead of wood screws for holding the canopy in place—especially if you have to remove the wing to transport your plane.

The Extra 300 is a sharp-looking airplane, and it's a lot of fun to fly. It's definitely for experienced fliers, though, and not beginners. Under the power of the O.S. 70 Surpass, it will do just about any aerobatic maneuver in the book, fly at a comfortable speed and give respectable vertical performance. A 2-stroke .45 should work well, too, but unless you want out-of-sight vertical performance and are into doing knife-edge loops, I think a larger 4-stroke (such as the O.S. .91 Surpass) would be too much for an airplane of this size.

Wouldn't it be great if Hobbico followed this act with a .60 to .90 2-stroke/1.20 4-stroke version? After all, bigger flies even better!

*\*Here are the addresses of the companies mentioned in this article:*

**Hobbico/Great Planes Model Distributors**, 1608 Interstate Dr., Champaign, IL 61820.

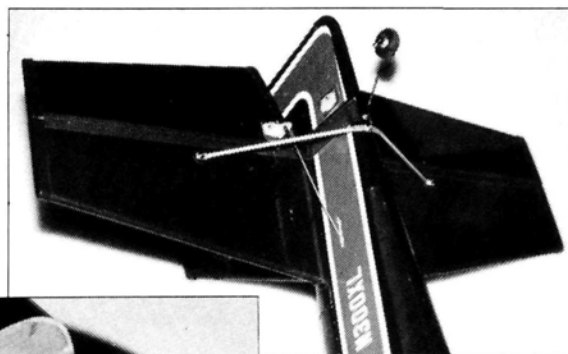
**Satellite City**, P.O. Box 836, Simi, CA 93062.

**Sullivan Products**, 1 N. Haven St., Baltimore, MD 21224.

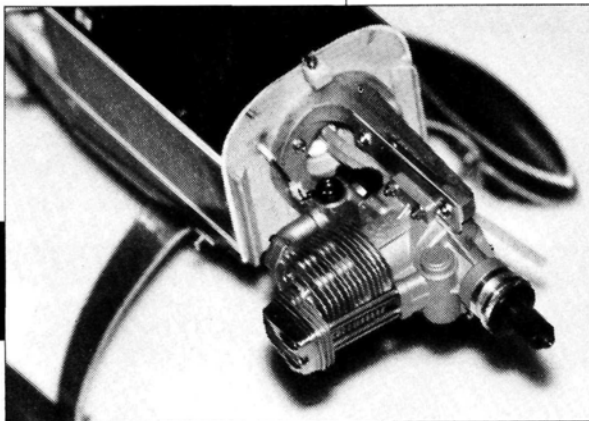
**O.S. Engines/Great Planes Model Distributors**.

**APC/Landing Products**, P.O. Box 938, Knights Landing, CA 95645.

**Futaba Corp. of America**, 4 Studebaker, Irvine, CA 92718. ■



The stab is supported by aluminum struts.



The O.S. 70 Surpass 4-stroke proved to be the right powerplant for the Extra 300.

## FLOATING AROUND

(Continued from page 67)

on May 10 through 12, and I expect a lot of modelers will show up to put in a couple flights for Mo Curry. We're going to miss him very much.

\*Here are the addresses of the manufacturers mentioned in this article:

**The Beast**, John Sullivan Float Products, 1421 2nd Street, Calistoga, CA 94515.

**Balsa USA**, P.O. Box 164, Marinette, WI 54143.  
**U.S. Air Core Model Mfg.**, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248.

**CK Models**, 656 Elmwood Ave., Suite 400, Buffalo, NY 14222.

**Bob Martin**, Schneider Cup Chairman, 1520C Acoma Ln., Lake Havasu City, AZ 86403. ■

## AIRWAVES

(Continued from page 11)

### SEEKS SMALLER ULTIMATE

Yo! I love your mag! I need info on where and how to get a .20- to .30-size Ultimate 10-300 biplane. I love the Ultimate; most people think it's ugly, but what do they know about style! I'm also curious about how to reach Precision Built, Inc. I know from reading your March '91 issue that they're in Spring Branch, TX. I need prices, etc.

I'd also appreciate info on what a knife-edge spin is. I've been flying for a long time, and I've yet to find out what that maneuver is. And, hey, keep up the killer job!

MATT LYONS  
San Ramon, CA

Thanks Matt, we're working hard to bring you even more of the best R/C coverage in aeromodeling. At the Pomona, CA, RCHTA trade show, I found a new, ARF Ultimate Biplane in the .40 to .50 size, and that's the smallest we know of. Contact Cermark Electronic and Model Supply Co., P.O. Box 2406, 107 Edward Ave.,

(Continued on page 77)

## PLT?

### Pronounced P-L-T (Piston Locking Tool)

If your model has a glow plug engine and you have to tighten anything to the output shaft such as fans for ducted fan jets, propellers, clutches and flywheels in cars and boats, and, oh yes, the Concept 30 helicopter fan nut — You need at least one PLT. The Concept 30 owners manual instructs you to remove the back plate from the engine and secure the crankshaft to install the fan and clutch. So far, so good. Ever have the fan and clutch loosen after the helicopter has been completely assembled? A MAJOR JOB just to tighten one nut that loosens all too frequently. Well... not anymore! PLT even works without removing your fuselage!

Simply remove the glow plug and screw the PLT in its place till finger tight (we even supply the wrench to remove the glow plug) and then tighten the fan nut. 1-1/2 to 2 minutes - not hours. Could be the most important tool in your field box & tool box at home.

1 PLT - \$8.95 2 PLTs - \$15.00

## DEW System

(Distant Early Warning)

**Electronic LED Voltmeter.** Brighter LED's can be seen from farther away during flight. 10 LED's (7 green - 3 red) show you the gradual usage of receiver battery voltage. Two modes of operation. Bar mode: all LED's are on showing a full charge. One LED at a time turns off as power is used. Dot mode: One LED gradually moves down the scale (draws less current). DEW's on/off switch replaces the main power switch and wiring harness you now use. It is completely wired and housed in an impact resistant box. No soldering necessary. Universal plugs included for most radios so there is nothing else to buy. Weighs 19 grams complete with wiring harness & switch. Size: 1 1/2" L x 1 1/4" W x 3/4" D. 1 DEW - \$39.95 2 DEWS (DEW DEW) - \$37.50 ea. 3-4 DEWS - \$35.00 ea.

**Don't lose your RC model because of a faulty or low receiver battery. Takes only minutes to install!**

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FS-48	9.95	60/80/90/	
FS-60/75/90	12.95	120-4C	12.95
FS-61	12.95	120-4C	21.50
FS-120/120S	19.95		
		SAITO	
HP		FA 40/45	\$8.95
VT-21	\$7.50	FA 65	12.95
VT-49	8.95	FA 120	19.95
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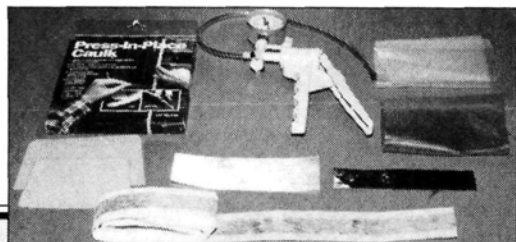
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**L**IKE MANY composite construction techniques, vacuum bagging wings is easy, and anyone can do it. It's one of the fastest methods of constructing a strong, perfectly finished, accurately shaped wing, and it doesn't require many special tools, or cost a lot of money. There are different approaches to vacuum bagging, just as there are to other building methods, but I've found that the following works well for beginners.

Many different materials can be used to sheet a foam wing. I'll describe a fiberglass-covered wing that's reinforced with carbon-fiber tape. Balsa sheeting can also be laminated to the foam core with or without the application of glass-cloth. If balsa sheeting is used, 1/2-ounce fiberglass provides ample strength. If the sheeting over the foam cores is fiberglass alone, then either 3- or 6-ounce cloth can be used.

The Sucker Kit from Composite Aircraft Engineering & Supply\* (list price \$59) is one of the easiest kits to use. It includes a hand vacuum pump of the type com-



**1** Some of the items you can use: top, left to right—3M Press-In-Place caulk for sealing the bag; MityVac's hand vacuum pump to create the vacuum; bagging tubes. Middle: Bondo paddles to spread the epoxy; unidirectional S-glass and unidirectional graphite, which can be substituted for fiberglass. Bottom: no-fray, unidirectional, carbon-fiber tape.

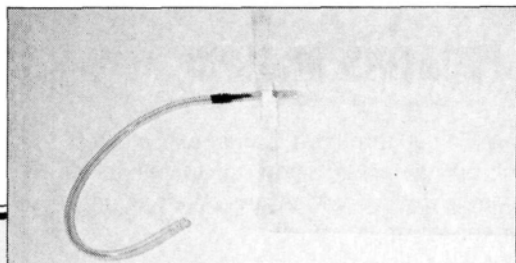


**2** Contents of the epoxy finishing kit from Aerospace Composite Products. Top, left to right: E-Z LAM epoxy, mixing cups and trays, mixing sticks, 15 feet of satin-weave, 3-ounce cloth and five pairs of latex gloves.

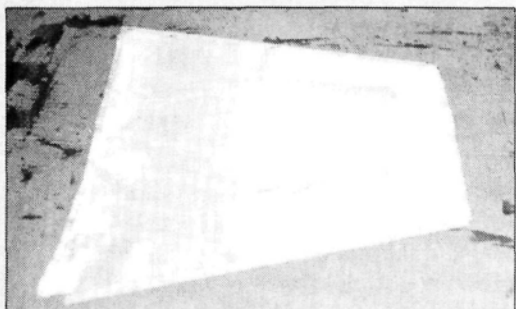


**3** Three-ounce fiberglass cloth with two strips of no-fray tape all cut to size.

**One of the fastest methods of constructing a strong, perfectly finished, accurately shaped wing.**



**4** Cut a piece of tube at least 2 feet longer than the wing core. Cut a piece of caulk that's approximately 3 inches longer than the bag's chord. Fold the end of the caulk over onto itself so that there's a double layer in the corners of the bag. Lay a piece of tube from the vacuum pump across the caulk so that the end is about 2 inches inside the bag. Cut a 3-inch piece of caulk, and lay it over the top of the tube and onto the caulk below. Press the top surface of the bag down into the caulk, and make sure there are no gaps or openings, especially around the tube. With a rolling pin, roll the edge of the bag flat. Double-check for gaps or air pockets, then set the bag aside and mix some epoxy.



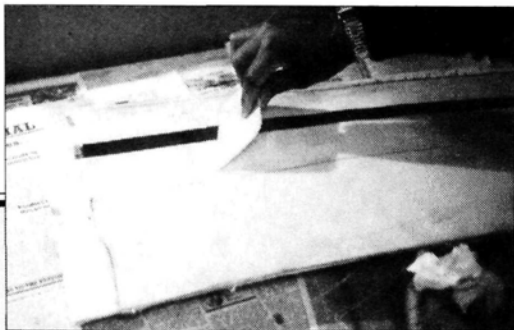
**5** Place the fiberglass on top of the Mylar, and pour a line of epoxy onto the glass-cloth.



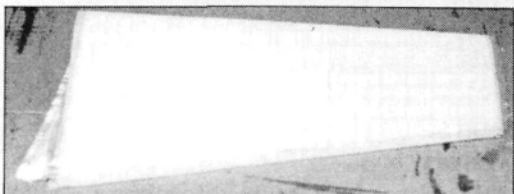
**6** Using a Bondo Paddle, or a credit card, spread the epoxy around until all of the glass-cloth is wet. Next, go back over the glass-cloth with the paddle, scrape up the excess epoxy, and put it back in the mixing cup. Continue this process until most of the epoxy has been removed and the glass-cloth takes on a flat, almost dry look. In the photo, the top section has already been done; the bottom section still has excess epoxy to be removed. The more epoxy you remove, the lighter your finished wing will be, so take your time and do it right. Make sure there are no wrinkles or air pockets in the glass-cloth.

# Vacuum

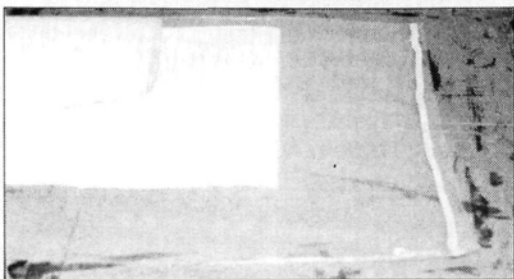
FOR TRUER, LIGHTER,



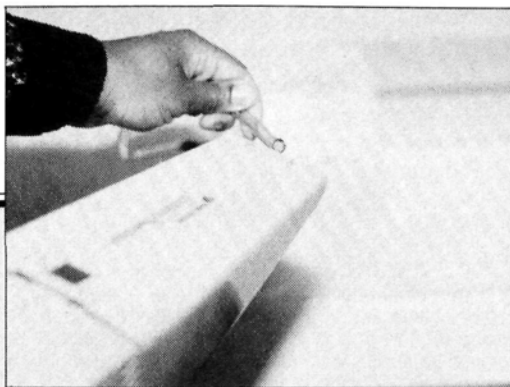
**7** Lay one strip of carbon-fiber tape about one third of the way back from the edge of the glass, and make sure that it's straight. Lay the other strip the same distance from the other edge. The carbon fiber will reinforce the high point of the spar location on the finished wing. Pour some more epoxy along the carbon fiber, and "wet it out" as described earlier. Remove the excess epoxy. The photo shows loose carbon fiber, but I recommend no-fray tape.



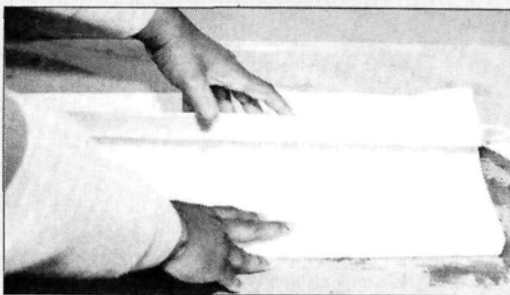
**8** Lay the foam core on the epoxy/glass about 1/8 inch from the (center) trailing edge. Fold the edge of the Mylar/glass over the top surface of the wing (think of a taco). Make sure that the wing's trailing edge hasn't moved forward. Smooth the top of the Mylar down over the wing core, and move the wing and cardboard to the side. The total time from mixing the epoxy to bagging the wing is 10 to 15 minutes.



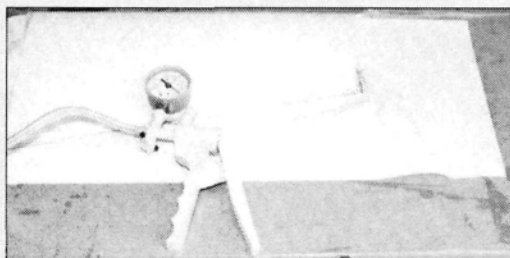
**9** Before you lay the vacuum bag out on your bench, make sure there isn't any spilled epoxy on the bench. Lay the Mylar on a long sheet of paper towel. Slide the whole thing into the bag, and to help ensure a straight trailing edge, place the core's trailing edge against the crease in the edge of the bag. Make sure the core hasn't shifted in the Mylar and that you haven't created any wrinkles. Do this now because it can't be fixed once the bag is sealed. Take your time. When everything is properly placed in the bag, seal the open end with caulk, and roll it shut. The paper towels under the core help air wick through the bag and soak up the excess epoxy that's forced from the glass by the vacuum.



**10** Smooth the bag with your hand to get out most of the trapped air. Now suck the remaining air from the bag. I strongly recommend using a Dust Buster or household vacuum to do this. Don't suck the air out with your mouth; epoxy fumes can be dangerous to your lungs. Hook-up the hand vacuum pump to the tube, draw a test vacuum, and check for leaks. If everything is satisfactory, release the vacuum.



**11** Put the bag in the top cradle from which the core was cut, and lay it on the bench with the curved side up. Place the core—bag and all—into the cradle. Smooth out any wrinkles, and hold the core down firmly in the cradle (don't press too hard and dent the core). Draw a vacuum of about 3 inches of mercury. To help remove any trapped air and to stick the glass-cloth to the wing, roll the core lightly with a rolling pin.



**12** When you're satisfied that there are no wrinkles or trapped air, draw about 7 inches of mercury vacuum. (Use about 5 inches for white foam, 7 inches for pink foam and 10 inches for blue foam.) Remove the bag from the cradle. If the wing was straight when you pulled the vacuum, it will be straight when you take it out of the bag.

monly used for automobile brake bleeding and enough plastic bagging to make several wings. You can also buy a hand vacuum pump from an auto parts store (e.g., National Auto's MityVac brake bleeder pump, which lists for \$25). I used one of these pumps and bought bagging material from Composite Aircraft Engineering & Supply (photo 1). I also recommend their fine video on vacuum bagging.

Aerospace Composite Products\* offers an Epoxy Finishing Kit (photo 2) that includes all the glassing materials needed to build several wings. Write to them for a complete catalogue.

#### PREPARATION

It's easier if you have all your equipment ready before you mix the epoxy. Make sure that all the pushrod tubes, spars and wing joiners are installed properly in the foam core and that the tip and root ribs are also attached. Fill any imperfections in the foam core with spackle. Lay out some newspaper to cover your work-

# Bagging

STRONGER WINGS

by BILL GRIGGS



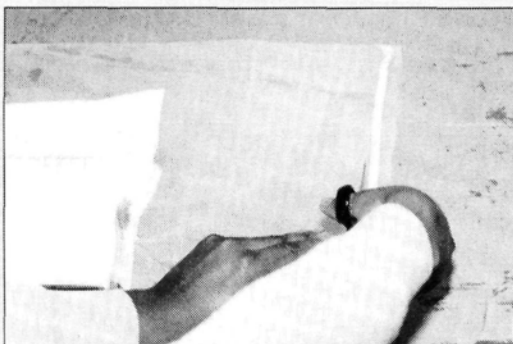
bench; then place cardboard over your working area. Cut two pieces of Mylar (one top and one bottom) that are 1/2 inch larger overall than your foam wing core. Place the two pieces of Mylar side by side. The edges that correspond to the wing's trailing edge should have about a 1/16-inch gap between them. Tape the Mylar pieces together along the center.

Lay down the fiberglass cloth, and cut one continuous piece that's the same size as the attached pieces of Mylar. Put the glass aside for now.

Next, measure two pieces of carbon-fiber tape that are 1 inch longer than the Mylar span. I recommend Aerospace Composite Products no-fray tape (photo 3)—a 1-inch-wide, unidirectional, carbon-fiber tape sandwiched between two strips of light, non-woven, glass fabric. It won't unravel when cut, and it's easy to "wet out" with epoxy. If you use another brand, make sure you apply masking tape over the carbon-fiber tape before you cut it. (Cut only on the masking tape, or the carbon-fiber tape might unravel).

For the rest of the procedure, see photos 4 through 17 and their related captions. I think you'll find that

**13** Clamp some spruce spars along the trailing edge. Put the bag aside while the wing cures (at least 24 hours). To ensure that the bag is holding a vacuum, check the vacuum gauge for the first hour or so. Some drop will be normal because of the trapped air that escapes. The most critical time to maintain a vacuum is during the first hour while the epoxy sets. If the bag leaks, you won't get a glassy smooth finish on the wing.



**14** After the wing has cured, cut open the end of the bag without the tube. Cut as close to the caulk as possible because the bag is reusable. Unclamp the spruce trailing-edge strips, and remove the wing from the bag. The bag won't stick to the epoxy, so it should release easily. You'll notice that the paper towel is saturated with epoxy and has adhered to the Mylar. Carefully tear the towel loose, but leave any stubborn parts for now.



**15** Find the edge of the Mylar, and lift it until you can get a finger between it and the cured glass-cloth. Run your finger the length of the core, and the Mylar should begin to peel away. Once that side is done, peel off the other. Be careful along the trailing edge, as it's razor-sharp. Save the Mylar; it's reusable. You should now have a core that's as smooth as glass. Once you've trimmed the excess glass-cloth from the edges, you're ready to paint. If you decide to paint the wing (you can fly it as is), then lightly buff the surface with steel wool. I suggest red oxide auto primer as a base coat, followed by your favorite paint or enamel.

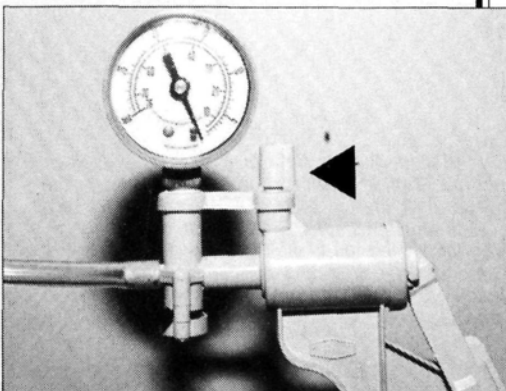
this technique is relatively easy and produces stronger, better flying airplanes in nearly any category.

*\*Here are the addresses of the companies mentioned in this article:*

Composite Aircraft Engineering & Supply,  
P.O. Box 866, Lapeer, MI 48446.

Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714

**16** Top: main wing panel for Ligeti Stratos. I used 3-ounce cloth and no-fray tape, with a second layer of 3-ounce cloth on the top from the LE to the spar. No LE dowel was used. Weight: 4 ounces. Middle: canard panel for Ligeti Stratos after trimming, but before 60-degree sweep cut at wing root. Three-ounce cloth was used with a carbon-fiber tow spar on the bottom; 1/8-inch dowel LE, weight 2 1/2 ounces. Core weight before bagging, 1 1/4 ounces. Bottom: canard panel for Stratos with sweep cut. Six-ounce cloth used. Carbon-fiber tow, top and bottom; 1/8-inch dowel LE; weight 4 ounces.



**17** Leaks sometimes occur in the plastic bag or the pump. If the bag leaks, you must replace it. If your pump leaks, it might be the pressure-relief cap. Simply remove the valve cap and re-glue it with thick CA; this usually seals any leaks.

## M A T E R I A L S

- MityVac vacuum pump or the Sucker Kit
- Vacuum bag material
- 3M Press-in-Place caulk
- Drafting Mylar
- 3- or 6-ounce glass-cloth
- 12 feet of carbon-fiber tow (no-fray tape is best)
- E-Z LAM epoxy or similar laminating epoxy
- Can of spray mold release
- Isopropyl alcohol (not rubbing)
- Bondo paddles
- Paper cups, paper towels and rolling pin
- Masking tape
- Large piece of cardboard (so you don't ruin your work-bench)

## AIRWAVES

(Continued from page 73)

Fullerton, CA 92633; tel: (714) 680-5888 for details. Precision Built, Inc., the company that framed most of the Ultimates flown at the 1990 Tournament of Champions, can be reached at Star Route 1 Box 433, Spring Branch, TX 78070; tel: (512) 935-2830.

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TA

(Continued on page 82)

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F-104 Starfighter	37"	75"	7 lb
MiG-21 Fishbed	47"	71"	7 lb
SR-71 Blackbird	47"	96"	11 lb
F-4 Phantom	57"	87"	14 1/2 lb
F-18 Hornet	56"	84"	13 lb
F-15 Eagle	57"	75"	12 lb
MiG-15	56"	56"	8 lb
MiG-17	47"	55"	8 lb
MiG-19	50"	83"	11 1/2 lb
YAK-23	57"	53"	9 lb
SU-27 Flanker	64"	102"	15 lb
F-14 Tomcat	77"	74"	12 1/2 lb
Tornado	64"	99"	11 1/2 lb
Macchi MB 339	61"	62"	8 lb
Fiat G91	48"	58"	7 lb
F9F2 Panther	57"	58"	8 lb
EFA Eurofighter	62"	80"	13 lb
Mirage 2000	42"	70"	7 lb
X3 Stiletto	39"	87"	7 lb
YF23 A.T.F.	58"	90"	14 lb

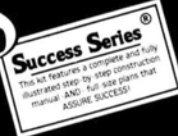
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# USING CARBON

## PART I: TIPS FOR BUILDING WINGS

by GREG POPPEL

**C**ARBON FIBER isn't a "top secret" material that's only available to top fliers! In fact, everyone who owns a plane—from 1/2A to giant scale—should be using it. I've read a lot of articles, and the consensus

seems to be, "Build light; light flies better." Hey, facts are facts!

This series will give sport fliers some tips on how to use carbon fiber to "build light" without sacrificing strength. In this part, I'll discuss how to strengthen wings.

Carbon fiber's high tensile strength makes it stronger than steel, yet as light as a feather. It's so light that many glider pilots and 1/2A-Texaco pilots have been using it for a long time. There are a few things you should remember about working with carbon fiber:

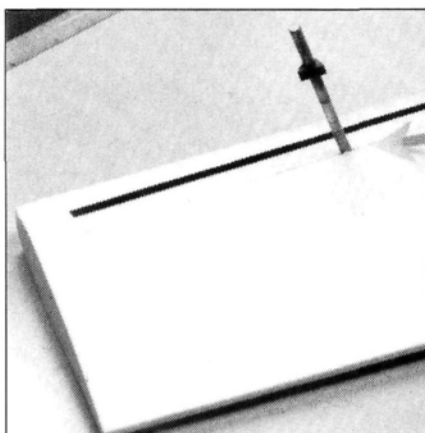
No big secret!

- Wear gloves when you work with it. The fiber tends to splinter, and pieces of it could lodge in your fingers.

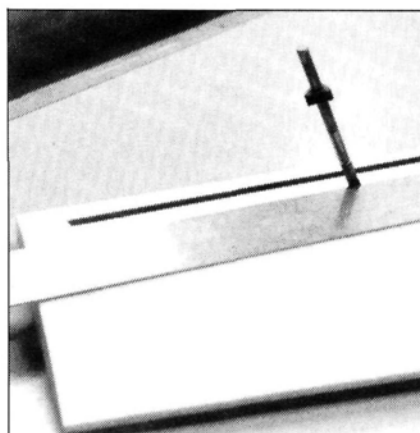
- It's very difficult to cut, so you'll need a carbide-rod saw or a razor saw. (Although you could use an X-Acto knife,



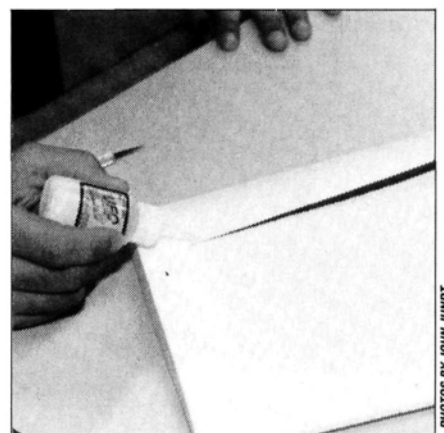
1. Here are the tools and adhesives you'll need to work with carbon fiber. Although many companies sell and distribute carbon fiber, few know as much about it as Aerospace Composite Products\* and Bob Violett Models\*.



2. It's easy to strengthen foam wings with carbon fiber. All you need is a 1/4-inch-wide strip of .007-mil-thick fiber that's cut to about 80 percent of the wing's length. Find the wing's highest point and make a cut in it that's as deep as the blade on a no. 11 X-Acto knife will permit.



3. Use a straightedge to cut a straight slit. Center and test-fit the piece of carbon fiber. In this example, we're adding the carbon-fiber strip to the wing's top surface to increase its ability to withstand negative Gs (the assumption is that the wing is already adequately stressed for positive Gs). Whether you add carbon fiber to the top surface, the bottom surface, or both, depends on what you want the wing to do.



4. Insert the carbon fiber into the slit, and glue it into place. (The thick version of UFO\* CA is safe to use with most types of foam.) If the wing is hollow you might want to put a similar piece of carbon fiber on the bottom surface, too. If the plane has retractors, put a 6-inch-long piece of .014-mil-thick carbon fiber along the trailing edge of the cutout (i.e., between the rear of the cutout and the wing's trailing edge).

PHOTOS BY JOHN JUNDT



# FIBER

it would take forever, and the blade would become dull quickly.)

● You have to scuff the carbon fiber's surfaces with sandpaper before you apply CA or epoxy to them. Wear a filter mask when you sand.

● Many types of CA and epoxy work well with carbon fiber.

● To strengthen wings (foam and wooden), you should use .007-mil-thick fiber. To reinforce the area near retract cutouts, .014-mil-thick fiber is best.

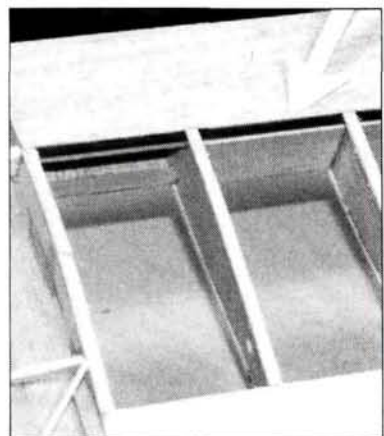
In a future issue, I'll provide more useful information on using carbon fiber.

*\*Here are the addresses of the companies mentioned in this article:*

**Aerospace Composite Products**, P.O. Box 16621, Irvine, CA 92714.

**Bob Violett Models**, 1373 Citrus Rd., Winter Springs, FL 32708.

**UFO**; distributed by Satellite City, P.O. Box 836, Simi, CA 93062.



**5. For a wooden wing, use .007-mil-thick carbon fiber that's the same width as the main spar. Glue it to the top and bottom of the spar before you add the cap strip and the sheeting. This will strengthen the wing by 300 percent!**

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**W**ITH 85 registered pilots, 125 airplanes and several thousand spectators, last year's R/C World's Fall Festival in Florida was a huge success! The Fall Festival is more than an R/C model fly-in; it's a miniature-aircraft air show that's designed to please both pilots and spectators. There's no competition for the fliers, just lots of flying and hangar talk.

The R/C World Flyers have one of the finest flying sites in the country. It has approximately 90 acres of cleared land and a 450x50-foot blacktop runway with a close-cut grass runway running alongside it.

Scale models dominated the fly-in; there were lots of Ultimate biplanes, Cubs, Lasers, Extra 200s and 230s, Diablos, F-4 Phantoms, F-15s, F-16s and many one-of-a-kind scale models. There were also a lot of Big Bees, Bizzle Bees, Ugly Sticks and electrics.



■ 1. Keith Goff's gorgeous, 1/4-scale, 90-inch-span Waco Mystery Ship flies extremely well.  
 ■ 2. Phil Corso waits for takeoff clearance with his Curtiss P-40.  
 ■ 3. Phil Corso's beautiful, great-flying Byron AM-5 Zero.  
 ■ 4. Dave Ribbe's F-16C is done up in desert camouflage.  
 ■ 5. Paul Lupia and his son, Paul Jr., with his Yellow Aircraft F-16C.



■ 6. Ed Sweeney's full-scale Aerocar. Four of these planes were built in 1952, but this is the only one left. ■ 7. With an 8 1/2-foot wingspan, Ron Ross' Grumman Tigercat was one of the largest models at the fly-in. It was very realistic in the air. ■ 8. Frank Buzduhanov's scratch-built, immaculately finished Piper Pawnee flies very well.



## R/C WORLD'S 7th Annual Fall Festival

by WALLY ZOBER

PHOTOS BY WALLY ZOBER



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## AIRWAVES

(Continued from page 77)

### BUDGET BLACKBIRD

I need help! I'm scratch-building an SR-71 from one of the early plan sets. I plan to use 2 HB .61s with 12x6 props. Because I can't afford the ducted-fan systems available, I'll need some type of prop-shaft extension to help me balance

the model. Does anyone make this type of extension?

ROBERT O.L. DINGUS  
*Operation Desert Storm*

*Robert, Given the long fuselage of the SR-71 Blackbird, it seems unnecessary to put the engines farther forward than in a standard pusher configuration. By positioning your airborne electronics forward*

*in the fuselage, you may be able to counterbalance the weight of the engines. This would also reduce the complexity of the drive-shaft extensions and the weight of the shafts themselves. One last consideration: in the pusher configuration, you must consider prop ground clearance. Make sure you have enough clearance to allow the prop to rotate for takeoff.*

(Continued on page 98)

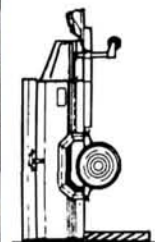
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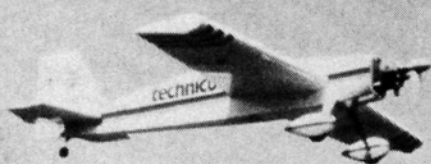
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# R/C WORLD



*Eric Dern's Diabolo was one of the giant models at the fly-in.*

## THE MAIN ATTRACTIONS

The air show featured the Cloud Dancers Show Team, Bob Fiorenze and his fabulous Tom Cook F-4 Playboy Phantom and R/C World's "Flying Saucer" show team. Ed Sweeny—the former publisher of "R/C Sportsman" magazine—brought his full-size 1952 Aerocar, which was on display for two days. On Sunday, he made a couple of low-level flybys with the Aerocar, and the spectators *loved* it.

The Cloud Dancers' routine is completely choreographed and includes low-level formation flying and head-on flybys, in which two aircraft—one inverted

scending, Less Fruh circled around them with his smoke-equipped, large-scale Laser.

## OTHER HIGHLIGHTS

- Lee Erminger demonstrated his "formation flying" model—four small airplanes that are joined with arrow shafts to create the illusion of several aircraft flying in formation.

- Bubba Spivey and Wayne Voyles did some low-level hot-dogging with their Lanier Stingers, both of which are equipped with smoke generators.

- Eric Dern, a very prolific model builder, flew his king-size flying "hot dog" with Donald Duck in the cockpit. Eric put on a great show; the

spectators loved it—especially the kids.

- Bob Fiorenze put on an excellent flight display with his Tom Cook F-4

Playboy Phantom. High-speed, low-level passes, inverted low passes, high-speed turns, vertical climbs—he did it all! To add to the realism of the routine, Bob used a new fuel that

gives off a generous smoke trail—very realistic!

- Jim Boyd came all the way from Canada with his Bud Nosen P-51 Mustang. This is a very large airplane; it has a 99-inch wingspan and weighs 37 pounds. It's powered by a Sachs 3.7 engine and swings a 22x10 wooden prop. It's equipped with LikesLine heavy-duty electric retracts and controlled by a Multiplex R/C System.

- Phil Corso had a super-flying, aerobatic Byron AM-5 Zero with an onboard electric starter and retracts. He

also had a beautiful Curtiss P-40 that flew well.

- Hal Parenti's ol' campaigner—the Piper PA-39 (Comanche) twin—has two O.S. 40 counter-rotating engines and weighs 15 pounds. With flaps, brakes, retracts and an

Airtronics Vision R/C system with seven servos, it flies very realistically.

- Thomas Gruenebaum brought his gorgeous Wedell Williams Special, which was a very popular racing plane back in the 1930s. The model is powered with a 3.7 Sachs engine and uses an Ace Silver "7" single-stick R/C system. It weighs 23 pounds and has an 85-inch wingspan, so it's stable and flies well.

- Don Lowe's 30-percent-scale Bob Godfrey Extra 300 is powered by a Sachs 3.2 engine and weighs 18 pounds. It's very aerobatic and true to scale, except for the airfoil. Don uses an

Airtronics Vision R/C System to control it.

- Terry Short flew a really nice Fairchild PT-19, which has a 109-inch wing. It weighs 21 pounds, is powered by a Koritz 3.7 engine and uses a 7-channel Futaba radio with nine servos. It's covered with Super Coverite and painted with acrylic lacquer.

- George Jordon flew a beautiful, 1/4-scale, 101-inch-wingspan Chipmunk. It weighs 24 pounds and is powered by a Quadra 50 and



*Here's Hal Parenti with his good-looking, great-flying Piper PA-39 Twin.*



*Built from a Bud Nosen kit and powered by the new Enya 80, Hank Likes' Cessna 310 flies very well!*

and the other upright—fly past each other at top speed only inches apart! The Cloud Dancers also have a plane that drops four radio-controlled parachutists. While the parachutists were de-

a 22x10 prop. It's controlled by an Ace Silver "7" R/C system with seven servos.

- Keith Goff had a stunning modified UPF-7. The full-size airplane was called the "Waco Mystery Ship." The model uses a Zenoah G-62 engine and Futaba R/C system. It has a 90-inch wingspan, weighs 25 pounds, and is covered with MonoKote.

- Ron Ross's Grumman Tigercat was one of the largest models at the fly-in. It's about 1/3 scale with an 8 1/2-foot wingspan; it's 7 feet long and weighs 34 pounds. It has Rhom-Air retracts for the main gear, Byrons for the nose gear and a 7-chan-

*(Continued on page 106)*

# H HELICOPTER SECTION

C O N T E N T S



**86**  
**Kyosho EP Concept**  
**by Datu Ramel**

**91**  
**Helicopter Challenge**  
**by Craig Hath**

**94**  
**Rotary-Wing Roundup**

*This month, Craig Hath continues his discussion of the FAI F3C schedule of maneuvers with a "Helicopter Challenge" column on the stall turn. See also Datu Ramel's review of the newest electric machine—the Kyosho EP Concept.*

*The photo shows a Soviet Mi-34P Hind helicopter, courtesy of Osprey Publishing.*



**A** LITTLE MORE than two years after introducing its Concept 30, Kyosho\* has brought the EP Concept to the American market. Great Planes Model Distributors has provided *Model Airplane News* with a production sample of this

05-size electric helicopter. Let's take a look at this new machine.

### THE KIT

On the box cover, and again in the instructions, Kyosho says this kit is for *experienced* pilots. You can tell right away

that this machine is VRF—Very Ready to Fly.

The booklet says, "Can be ready for flight in one evening." This is the most optimistic line about flight preparation I've ever seen in heli instructions—and it's true. The tail boom and tail casing are already attached to the mechanics with the proper belt tension. The rotor head comes assembled, and you can tell at a glance that the blades, canopy, fins and landing gear will go on with just a few screws.



K Y O S H O

# CONCEPT

by DATU RAMEL

## S P E C I F I C A T I O N S

**Type:**.....Electric helicopter  
**Rotor Diameter:** .....35.9 inches  
**Length:** .....31.9 inches  
**Weight:** .....47 ounces with a 7-cell pack  
**Power Req'd:** .....05 motor  
 (AP36 motor included with kit)  
**No. of Channels Req'd:**.....4 (conventional)  
 or 5 (heli)  
**Sug. Retail Price:** .....\$469.95

**Features:** the kit can be ready to fly in one evening. Loose parts are bagged and easy to identify. The tail boom and tail casing arrive already attached, and they have the correct drive-belt tension.

**Comments:** the well-designed EP Concept is manufactured to very high standards. The high level of prefabrication means it's easy to get airborne, but you must be thorough in your setup of the pushrods and the speed controller. The model is very stable in forward flight, but I don't recommend that beginners learn on an electric heli. To adjust the center of gravity, the drive battery can be easily shifted fore or aft.



## CONSTRUCTION

The EP uses a downsized version of the familiar Concept 30 rotor head:

push/pull rods control the flybar, and the blades and paddles lie in the same plane.

Unlike the Concept 30, which uses rubber dampers, the EP Concept uses two horizontal metal plates to damp the blade flapping. Each feathering axle is attached to its plate with a single bolt, which can be a pivot for lead-lag in addition to the blade bolt in the grip itself. When I saw this, I wondered whether the tightness of the bolts in the plates would affect the lead-lag or tracking. I tried the bolts tight, snug and loose, and the heli flew the same every time, so I concluded that the bolts had been set correctly at the factory—tight.

The main rotor blades are of the leading-edge-spar/foam-core/plastic-skin type first seen on the Concept 30. Each blade weighs about 28 grams, or slightly less than 1 ounce.

The “clamshell” mainframes completely enclose the gear train. The unit is very stiff and will probably be durable, but compared with open-frame designs, there’s a slight weight penalty.

The snap links and pushrods for the rotor head come assembled to within a half turn of the proper length. Just make sure the rods in each pair are of equal length, and write down your own

measurement (end to end or hole center to hole center) for reference.

Power is transmitted

from the motor by means of gears below the mainframes. Both of the 05-size electric helis

that are commercially available feature an idler or transfer gear between the motor pinion and the main gear. Fortunately for the designers, the extra gear not only gets the rotor-head speed in the right range without using a large main gear, but it also allows the blades to spin in the conventional clockwise direction with most 05 motors—which spin clockwise if you look at the endbell with the brushes. Of course, you must use an underslung gear train and mount the motor with the output/pinion end facing downward. (Looking from the pinion end, the motors spin counterclockwise—that’s why flat-track R/C cars with sidewinder motor arrangements have the pinion ahead of the rear axle on the right side.) Ewald Heim’s design was the first in .60-size helis to invert the powerplant, and this resulted in counterclockwise rotation for the main rotor.

The factory-installed autorotation gear is a big plus, but not for dead-stick autorotations, which, given the size and disk loading of most electric helis, aren’t recommended except under

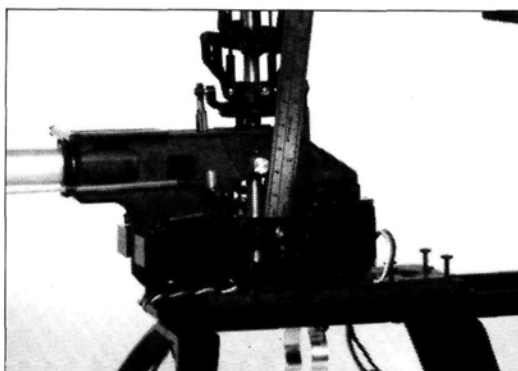
ideal headwind conditions. The autorotation gear allows the motor to relax at the start of a descent, and many pilots have reported gains of 30 seconds or more in flight times when converting from fixed-gear to free-wheel configurations.

The most critical part of assembling the EP Concept is setting up the feathering at the tail rotor. The tail-rotor grips, axles and hub in this *double* double-bearing design arrive assembled, and the instructions sug-

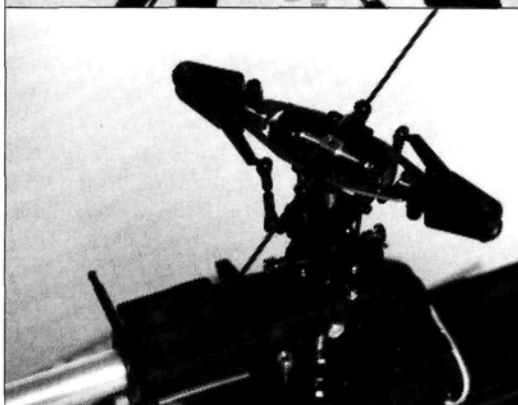
gest that you simply use a setscrew to attach the unit to the tail-rotor shaft after you’ve fitted the pitch slider.

The blade grips in my kit failed the “flick test”: when I flicked them with my finger, they didn’t spin freely on the feathering bolts. A binding blade grip that could worsen under centrifugal loads is no fun for an experienced pilot, much less for a beginner who might not be able to recognize the problem at the assembly stage. I re-

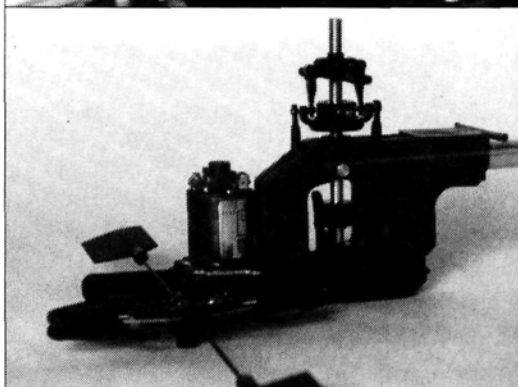
**E.P.  
FLOWN  
HOME**



◀ A ruler helps you position the pitch slider when you adjust the collective pushrod.



◀ See the metal flybar-control arm and metal flapping plates in this view of the rotor head.



◀ The AP36 motor, the swashplate and the concealed gear train come already fitted to the side frames.

PHOTOS BY BOB SADLER AND DATU RAMEL



# CONCEPT

moved the bolts, put on fresh blue Loctite\* thread-locking compound, threaded the bolts into the hub until they bottomed (the stock arrangement), then backed each one out 60 degrees or one-sixth of a turn. This was the only step that didn't benefit from a high level of pre-assembly.

The horizontal arm of the collective-pitch level that you're supposed to use as a reference when you set up the linkage is very hard to see when the servos are in place. For this step, position the pitch slider on the main shaft so that its top edge is 16.5mm below the top of the arch in the side frames.

The horizontal stabilizer fit loosely on the tail boom, so I shimmed the fin bracket with a short length of electrical tape to remedy this.

## POWER

Kyosho designed the EP Concept around the common 7-cell, 8.4V, 1200mAh battery pack. Why not? Look at all the R/C car users and shops

that have this pack configuration. There are many after-market options to give high capacity (up to 1700mAh, SCR, or SCE) and higher performance (computer-matched cells). The real reason for using fewer

## The EP Concept gets four stars for structural integrity.

than eight Ni-Cd cells for an R/C heli is that you can use one of the zillions of R/C car battery chargers out there. The one-off, do-it-yourself, electric R/C helis prior to the EP Concept used 14 to 28 cells and required the special techniques and charging systems associated with high-performance electric sailplanes.

The EP has a very good battery-mounting system. The front of the battery pack fits into a full bracket, and the rear of the pack is clamped in

with one sturdy rubber band. This allows for easy fore/aft adjustment of the center of gravity, and the aft clamp permits some breakaway effect in the event of a hard landing.

The AP36 motor provides for a Kyosho clip-on FET electronic speed controller (by means of a set of spade lugs on the motor endbell) that's said to be best for electric heli applications. I installed an older Kyosho ESP by using the fe-

male spade-to-bullet connectors that come with the kit. Pilots going for a full-house setup will probably use solder and/or Sermos Power Pole\* connectors here.

The four-screw, aluminum, motor-mounting plate contributes greatly to airframe stiffness and absence of vibration. Going electric instead of using glow power doesn't, by itself, get rid of all vibrations. Sure, the primary reciprocating motion has gone, but thin side frames and the con-

centration of mass in the battery pack can lead to secondary, or resonant, vibrations that are just as debilitating to the radio gear. The EP Concept gets four stars for structural integrity.

The kit contains a line drawing and a supplement sheet devoted to the Kyosho LeMans AP36 motor, wiring, leads, timing and break-in. There's an extra set of capacitors; you can install these to combat the interference that might affect your receiver. The AP36 motor has adjustable brush timing that was set at the factory to 4.5 degrees. There's no mention of this setting in the instructions or in the motor supplement sheet. I'm more inclined to do what Dwight Shilling has done, i.e., experiment more with a variety of motors and batteries than with timing.

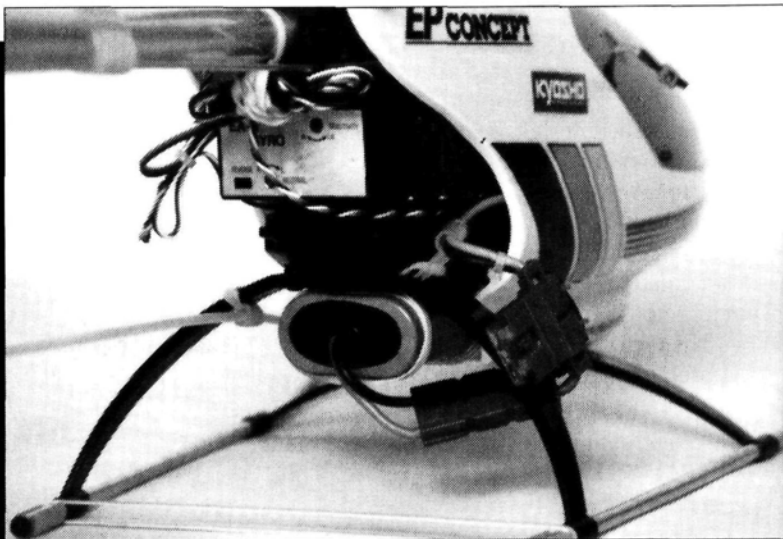
The supplement sheet doesn't say whether the motor should be broken-in free of the mechanics or while meshed to the gears. I did the former, so I removed the mounting plate with the motor attached. My break-in sequence was 40 minutes at 3.6 volts and 40 minutes at 7.2 volts.

## FINISHING

The plastic tube holding the tail-rotor wire has a hard time passing through the black support in the tail boom. Enlarge the hole with a needle file to avoid "hamfisting" and kinking the tail-rotor rod.

The guideline molded into the smoke-colored plastic gives you a windshield that's too large. You'll have to trim by

*This rear view of the mechanics shows the tail rear and the short front landing-gear struts and the author's aft positioning of the gyro control box, the Sermos connectors and the automotive fuse holder.*



trial and error to get the windshield to its final size. The instructions suggest that you use double-sided tape to attach the windshield, but I used the 2mm self-tapping screws that came with the kit.

The decals are blue, gray and silver metal-flake—very nice. The canopy is secured with two rubber grommets; simple and light.

## RADIO

The EP Concept kit provides mounting brackets for two sizes of servo. It takes an extra second or two to match the molded part numbers with the proper diagram, since the molded numbers are different from the reorder part numbers shown.

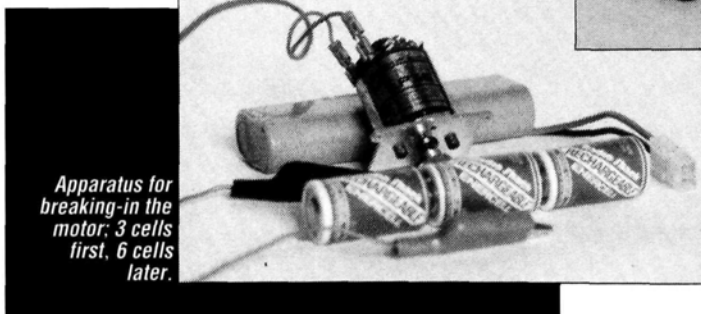
The servo positions are well-thought-out, and the servos have very short rods. It's important to install the aileron and elevator servos and their arms and rods before doing anything with the collective and tail-rotor servos. Once the collective and tail-rotor servo brackets have been screwed on, both of the cyclic servo-arm retaining screws are inaccessible.

I chose a Futaba\* F7GH radio and four S133 servos. Later, I'll try a PCM 1024H receiver and an S135 on collective, but for this review, I wanted to show how the EP Concept would fit most pilots' situations—as a second or third "fun" helicopter, not necessarily tying up your best R/C gear.

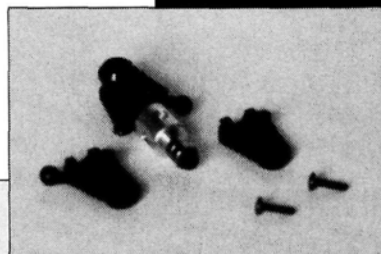
One complaint raised about the small electric heli is the expense of

four mini- or micros servos and a tiny gyro (the standard size won't fit). If you designed a heli around S130, S131, or S9201 servos and G154 gyros, you

rotor head and blades, and check that the throttle stick is fully down before I switch on the helicopter.



Apparatus for breaking-in the motor; 3 cells first, 6 cells later.



To eliminate binding of the feathering shaft bearings, you have to partially disassemble the tail rotor.

I saw that the tail rotor was out of trim. This was easy to adjust with the setscrew that holds the tail-rotor rod to the servo wheel. After the

third liftoff, I was able to "hover out" the pack, and I felt confident enough to sneak in a pirouette before the battery started to dump.

As is typical of electric helicopters, there isn't much excess power above hovering power, so you must be careful not to get into a fast vertical descent, because there may not be any "oomph" to arrest your motion as you near terra firma.

Hovering reveals a soft or "lagged" feel to the cyclic controls. After the first few seconds on the sticks, you're aware of having to use a different method to make corrections. Keeping the EP over a spot requires even more joystick deflection than when hovering, say, a Concept 30 DX or an old Shuttle with heavy paddles and flybar weights, but after a split second, you must be ready to relax the joystick command when the heli's attitude "catches up." If you don't, your attempt to correct tilt will become a sudden change

(Continued on page 109)

might just have to go to the next larger (and more expensive) motor and, thus, to a larger, heavier, more expensive and more difficult to charge battery system.

I installed the Alsonic\* EA-1 mini gyro, which became available when the Kalt Whisper was introduced.

## FLIGHT TESTING

Ready for takeoff, my EP weighed 2 pounds, 15 ounces (47 ounces) with the 7-cell pack. Eliminating the pair of bullet connectors, the fuse holder, some tie-wraps and some decals could save an ounce or two, but I'll get around to this type of serious weight reduction when I have some matched-cell packs to fly with.

To check the controller's performance, I ran one pack without the blades attached. My older speed controller sends a voltage spike to the motor when I turn on the receiver, so I've learned to hold the heli high and away, spin the

A couple of minutes adjusting the pots on the controller ensured that full voltage comes at high stick and that the motor is off at low stick. Running at high stick without the blades helps check flybar balance and motor vibration.

I bolted on the main blades and put in a cycled and peak-charged battery. The first liftoff showed a little tracking error, which I eliminated

**Ready for  
takeoff, my  
EP weighed  
2 pounds,  
15 ounces.**

with one half-turn of a pitch-control rod. The blades all weighed the same out of the box, and they didn't vibrate or show other evidence of imbalance once the tracking had been set.

On the second liftoff,

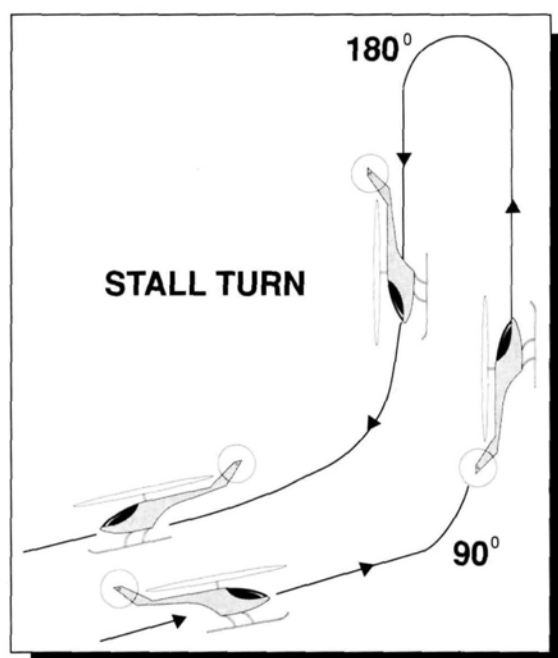


# Helicopter Challenge

## Perfecting your stall turn

by CRAIG HATH

**D**URING THE LAST few months, I've been extremely busy preparing for the 1991 competition season. Starting with this issue, I'd like to share some of the experiences that I've had on my way to the July National Championships in Lawrenceville, IL.



I'll compete in the FAI F3C Helicopter Aerobatics Event, which consists of nine compulsory maneuvers that are performed in the following sequence: a hovering "M"; a horizontal eight; a nose-in circle; a "top hat"; a 540-degree stall turn; loops; a roll; a rolling stall turn; and an autorotative descent with a 180-degree turn followed by the landing. A panel of judges scores the event, and each judge can award from zero to 10 points for each maneuver.

Perfecting these maneuvers is very challenging, and it helps to have the very best equipment you can find and afford. Reliability is critical, so I've spent a lot of time maintaining and improving my machine. In upcoming issues, I'll describe the competition setups and flying techniques that have worked well for me, and I'll review a Kalt Excalibur that has been set up for competition.

### STALL TURNS

**L**ast month, I discussed how to perform—and improve on—the basic loop. This month, I'll examine the Hammerhead, or stall turn, and discuss how to give

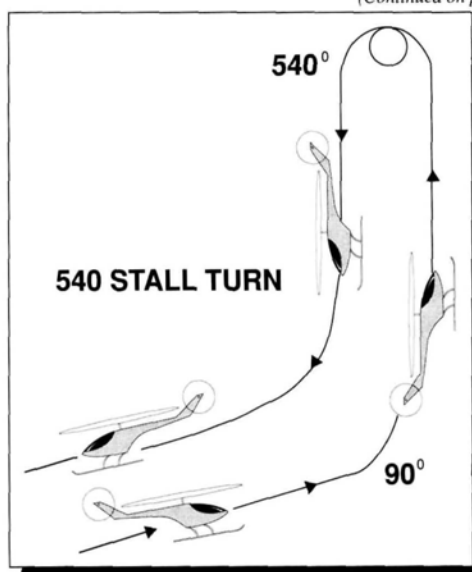
this basic maneuver some extra "zing."

Before I describe how to perform stall turns, I want to discuss how model helicopters are affected by them. The helicopter enters a stall turn from level forward flight, and throughout most of the maneuver, it travels at almost full speed. As the heli begins the turn, its nose is pulled up to the vertical position, and it moves upward vertically until most of its forward air speed is bled off. Just before the heli stops, its tail is kicked around, and its nose is pointed toward the ground. It regains air speed as it moves vertically downward and its nose is pulled back to the level position. The heli should exit the maneuver at the same altitude and in the same position as when it entered, creating an imaginary "L" if viewed from the side.

With a little imagination, you can figure out which control inputs are necessary for this maneuver. In case you're stumped, however, I'll go over the whole thing from beginning to end.

First, until you're comfortable performing this maneuver, be sure that the heli has plenty of altitude. With the helicopter moving along in fast forward flight—preferably headed into the wind—pull back on the pitch-cyclic (or elevator) control stick until the heli's nose is headed straight up. When the helicopter is perfectly vertical, release pressure from the stick. To prevent the heli from pulling itself over onto its back, it's also a good idea to reduce the throttle and the collective to the point where rotor-blade pitch is zero. This part might take

(Continued on page 92)

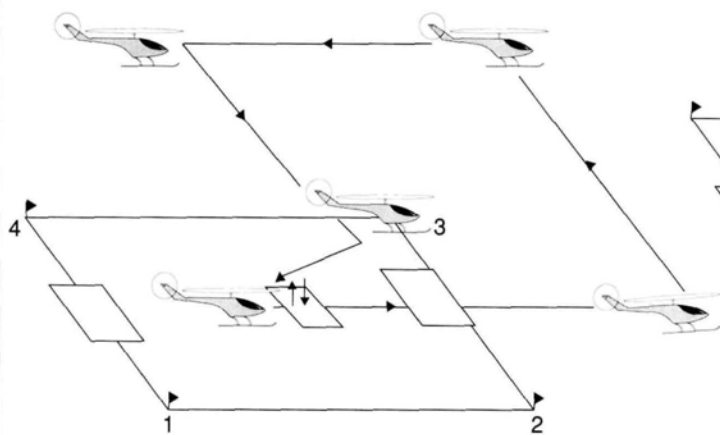


F3C Flight Program (Maneuver 5)

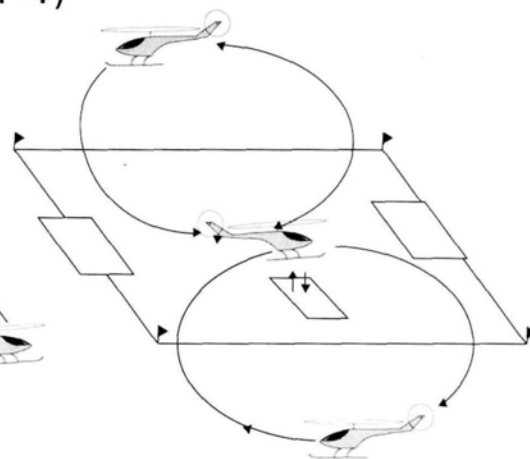
# HELICOPTER CHALLENGE

(Continued from page 91)

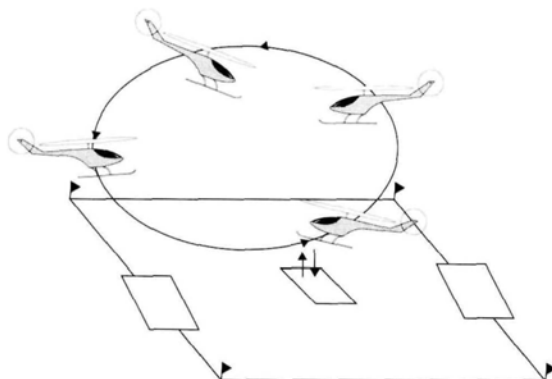
## F3C FLIGHT PROGRAM (MANEUVERS 1 - 4)



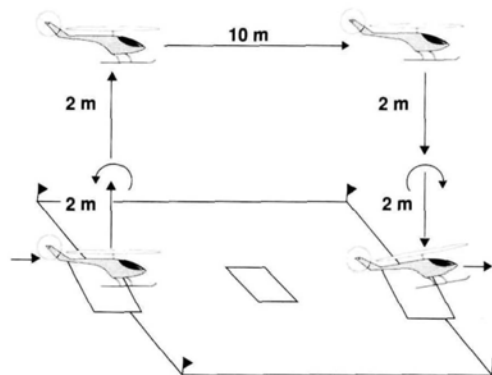
1. HOVERING "M"



2. HORIZONTAL EIGHT



3. NOSE-IN CIRCLE



4. TOP HAT

practice; some helicopters need cyclic-pitch corrections to keep their noses headed straight up. If the helicopter falls out of a vertical climb (either on its back or forward), simply let its nose drop slightly, and recover to level flight as the air speed returns. Repeat this process until you can maneuver the machine straight up vertically without problems.

As its vertical air speed decreases, try to catch the helicopter just before it stops dead in the air. If you've cut the throttle back to zero pitch, open it up about half way and grab either left or right tail rotor so that the heli's nose turns around and points straight down. Releasing the tail-rotor control at the proper time requires practice. There's often a lag in response from the time you release the control to when the heli's nose actually stops turning.

Let the helicopter proceed down the same line on which it went up. As it nears the entry point, gently pull back on the pitch cyclic to bring the heli's nose back to level, ease off the back cyclic, and be sure to re-open the throttle for normal forward flight. The maneuver is complete. The helicopter doesn't have to be specially set up or modified to perform stall turns with ease. If it

can move into forward flight and operate dependably at high speed, it will be able to perform some good stall turns.

## 540-DEGREE STALL TURN

**A**s you gain confidence, you can add another dimension to the stall turn—a loop at the top. In the "pinwheel," or 540-degree stall turn, at the point where the helicopter would normally turn only 180 degrees and then head downward, hold the tail-rotor control and allow the heli to spin around vertically one and a half times. Some words of caution here: make sure that the heli's nose is pointing downward when you stop the rotation.

Although it depends on your helicopter and the amount of tail-rotor control you have, you might find that your machine spins wildly during this maneuver. This looks great to spectators, but it can be unnerving for the pilot. Try 540-degree stall turns with extra altitude at first so that you have room to recover if you get into trouble. Stopping the helicopter with its nose pointing upward could force it into a tail slide. This

(Continued on page 109)



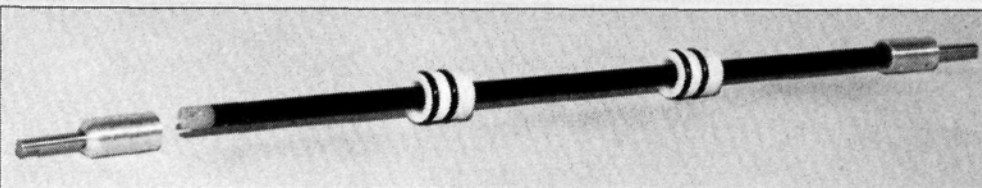
# ROTARY-WING ROUNDUP

## J.A. PRODUCTS Precision Tail-Rotor Drive Kits

J.A. Products announces the introduction of Tail-Rotor Drive-Shaft kits for Schluter helis (including the Magic, the Champion and the Scott 60), Miniature Aircraft helis (including the X-Cell 30, 40, 50 and 60) and the

Concept 30. The kits offer lower weight and higher precision than others. The Tail-Rotor Drive is designed to replace the tail-rotor drive wire that comes with helicopter kits. The drive-shaft components are of the lightest, most durable epoxy/glass, and parts have been precision-machined to exacting tolerances. Factory assembly ensures a precise fit

and consistently high quality. The drive tube is supported by two ball bearings. You'll notice an



improvement in the response and precision of tail-rotor control and appreciate the increase in reliability.

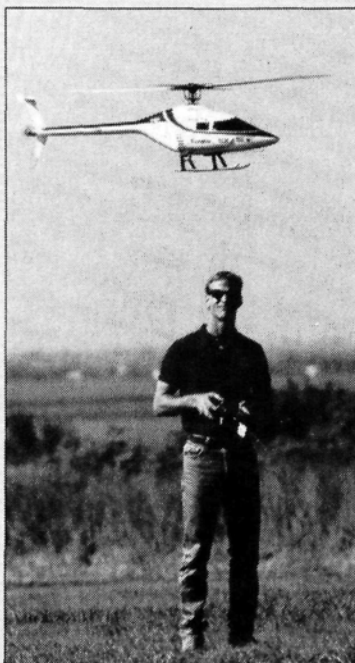
Prices: \$59.95 (Schluter and X-Cell 60)—limited-time introductory price, \$44.95 plus \$5 S&H.

For more information, contact J.A. Products, 95 Connecticut Dr., Suite C, Burlington, NJ 08016.

## GREAT PLANES RM Products Pulsar Body

Made of fiberglass that's covered with a white gelcoat, this streamlined fuselage is made specially for the Concept 30. It weighs approximately as much as a Kyosho Body even when it's painted, allows easy access to the complete mechanics, and it's ideal for fast forward flight and smoother aerobatics.

For more information, contact Great Planes Model Distributors, 1608 Interstate Dr.,

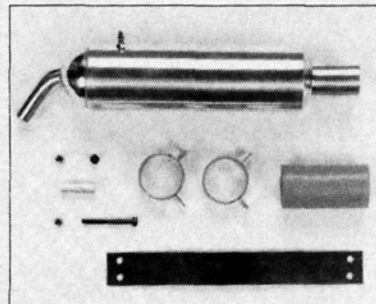


## MINIATURE AIRCRAFT USA Peace Maker Tuned Pipe

This tuned pipe fits all helis and is available in .30, .40, .50 and .60 sizes.

Price: \$59.95

For more information, contact Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.



## BONDHUS CORPORATION Tool Magnetizer/ Demagnetizer

Wiha® tools has introduced a Tool Magnetizer/Demagnetizer to its popular line of hand tools. On one side, there's a powerful permanent magnet (+) to magnetize items, and the other side demagnetizes (-) tools and small parts. Simply slide a tool through the box, and it's instantly magnetized or demagnetized.

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Part no. 40010

For more information, contact Bondhus Corporation, 1400 E. Broadway, Monticello, MN 55362.





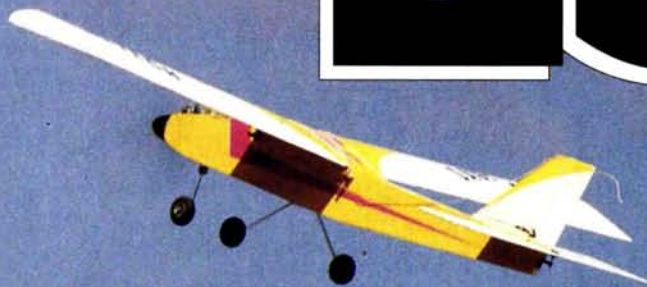
A L T E C H

SAGE

## 25 TRAINER

by MICHAEL SMITH

## Quick Study



**W**HEN I WAS FIRST approached about reviewing Altech Marketing's\* Sage 25 trainer, I was skeptical. There are already so many well-established reviewers in the field, that I wondered what I could do that hadn't already been done. After some thought, I hit on an idea that seems obvious now: why not have a novice modeler build the aircraft under my supervision? That way, I could get a real feel for the project's difficulty.

Those who've been involved in this wonderful hobby for a while, tend to take the knowledge they've accumulated for granted. Sometimes, they presume that newcomers are just as knowledgeable, but that simply isn't true. With that thought in mind, I asked my nine-year-old son to help with this project.

## THE KIT

On opening the box, we were pleasantly surprised to find that the model was virtually ready to fly. The kit's contents were well-packed in bubble wrap. Unfortunately, there wasn't a parts list, so it took a while to check that all the necessary items were included.

This kit is very comprehensive, so we

only had to buy a few things: a 4-channel radio, an engine, a propeller, a fuel tank and fuel lines, a spinner, three 2-inch wheels, wheel collars, adhesive and covering material. Excluding the

all the parts for damage (i.e., warps, loose joints, etc.). We discovered that the fuselage had been glued together with white wood glue, and some joints had only bonded on the surface. (This was the only flaw we found.)

We reglued all the joints using Innovative Model Products'\* QFA—a gap-filling, odorless CA. We also used a thinner version of it to reattach a loose section of wing skin to one of the wing panels. That's right!—we used this CA on Styrofoam, and it didn't melt the foam!

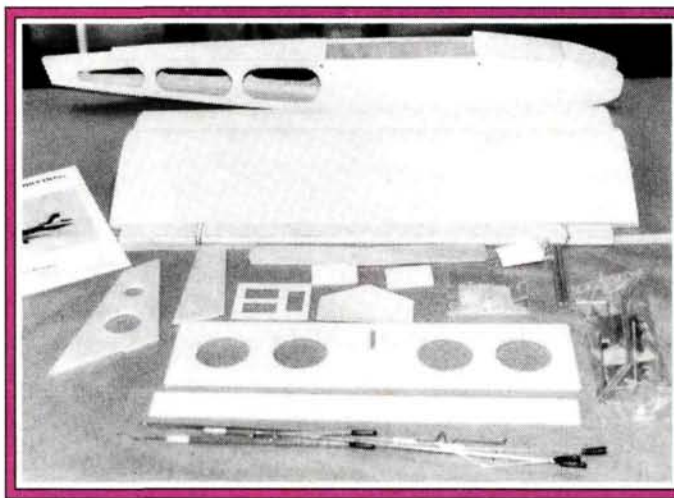
Next, we read the kit's excellent 13-page instruction manual. It has numerous photographs and line drawings to help illustrate construction. For novices, the illustrations should have been numbered and referred to by number in the text, but it

wasn't too difficult to determine which photograph went with which paragraph.

## CONSTRUCTION

Construction was straightforward, and there were only a couple of places where we deviated from the instructions. First, we built the sub-assemblies, and then we secured them to the airframe. In

(Continued on page 99)



The kit has a complete hardware package, cut parts and formed pushrods.

engine and the radio, these items cost less than \$40.

We had heard that the Sage 25 was very strong, and it is. Its fuselage is made of a durable, light plywood (the type that's used to make hollow door skins). This material was also used to sheet the foam-core wing panels and the horizontal stabilizer.

Before starting to build, we examined



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## AIRWAVES

(Continued from page 82)

Without this, you'll need a lot of runway  
to build up enough speed for a flat takeoff.  
GY

## MARATHON MAN!

I really enjoy your magazine! I'm looking for a model aircraft that will stay aloft for 2 to 4 hours at an altitude of 10 to 15 feet. It doesn't have to do aerobatics. I'd like to fly it in a circle or an oval with a radius of 300 to 400 yards. I'd use it 6 to 7 hours a day. I know very little about R/C because I'm just beginning. Could you suggest an aircraft and R/C unit?

With the new electrics, is there any way the wings could collect solar energy so that an aircraft could stay aloft longer?

MIKE WATSON  
Yuma, AZ

Mike, 6 to 7 hours of daily flying will definitely be good training for a slot in the Guinness Book of World records! Your best approach may be a blimp—assuming it isn't too breezy. Peck Polymers is noted for its miniature electrics and blimps, so

(Continued on page 101)

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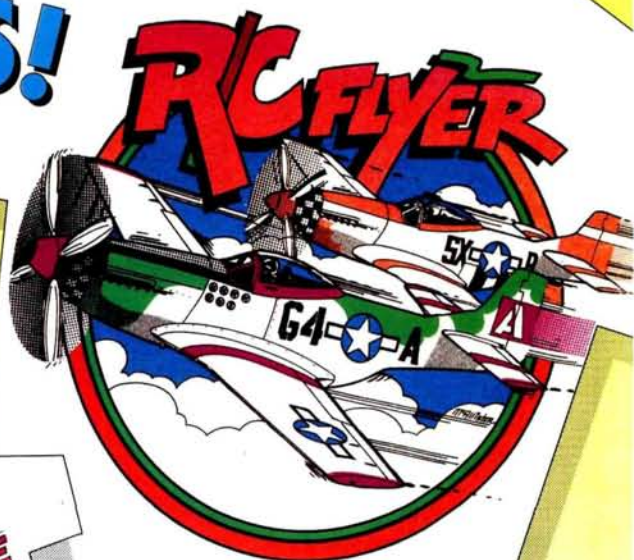
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**BACK VIEW**



# SAGE 25 TRAINER

(Continued from page 97)

Section 7, Step B, the instructions suggest that you use 30-minute epoxy to join the tail assembly to the fuselage. Instead, we used Powergel (a gel form of QFA that sets in about 3 minutes). We put a few dabs of it on the fuselage's flat plate and then put the stab assembly on top of it, making sure that the assembly was in the correct position before the glue set. Then we ran a bead of thick QFA on the outside of the fuselage, where it meets the stab. Using this adhesive enabled us to build more quickly and helped to reduce the plane's weight.

In Section 7, Step C, we used 5-minute epoxy to glue the dihedral braces to the foam instead of the 30-minute epoxy suggested. When it had set, we ran a bead of Powergel along the top and bottom surfaces, where the two wing halves join. We taped the wing halves

together as instructed, but we used thin QFA on the cloth tape instead of epoxy resin. This is a proven way to tape wing halves together. Besides, a joint's strength is determined by the fiberglass or cloth that's used, not by the adhesive.

The instructions let you decide whether to hinge the surfaces before or after you cover them, and we chose to hinge them first. I like to use toothpicks when I install hinges, because they prevent them from coming loose. I simply drill  $\frac{3}{32}$ -inch holes through the top surface, the hinge and the bottom surface.

## SPECIFICATIONS

**Type:** Sport/trainer

**Wingspan:** 56 inches

**Length:** 38 inches

**Weight:** 4 pounds, 2 ounces

**Wing Area:** 518 square inches

**Wing Loading:** 18 ounces per square foot

**Power Req'd:** .19 to .25 2-stroke

**Prop Used:** 9x6 Master Airscrew

**No. of Channels Req'd:** 4 (elevator, ailerons, rudder and throttle)

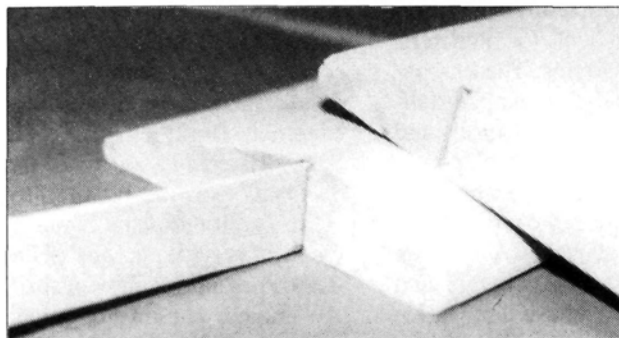
**Sug. Retail Price:** \$99.98

**Features:** the Sage 25 comes almost ready for covering: its plywood fuselage and tail surfaces have been built; its foam-core wings have been sheeted; its landing gear has been formed; and all of its surfaces have slots for hinges. It takes very little time to complete this model.

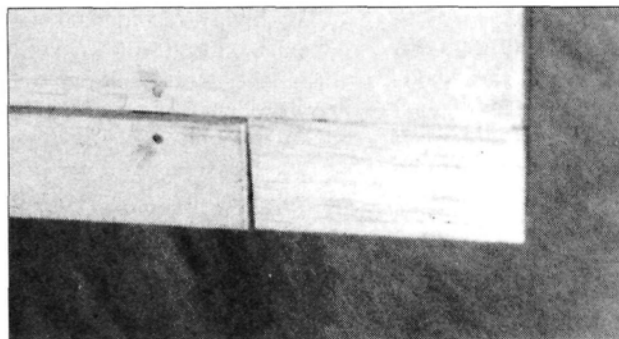
**Comments:** this sturdy model can withstand the abuse of a novice who's learning to fly R/C model aircraft. The kit doesn't include plans, and they aren't really needed. The instructions are well-written and complete.

Then I fill the holes with thick CA and insert toothpicks. When the glue has set, I cut off the ends of the toothpicks as close to the surface as possible, and then I sand what's left flush.

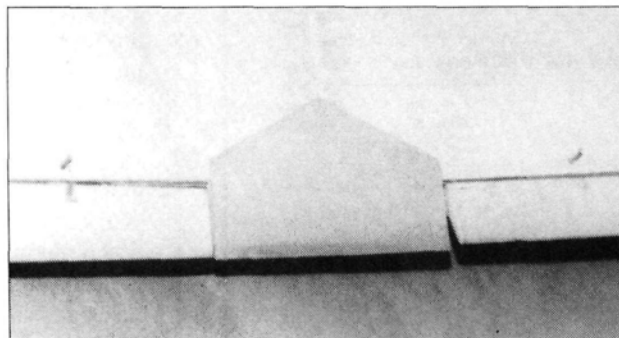
The kit has full trailing-edge strip ailerons. To reduce tip drag and aileron flutter, I recommend that you cut  $2\frac{1}{2}$



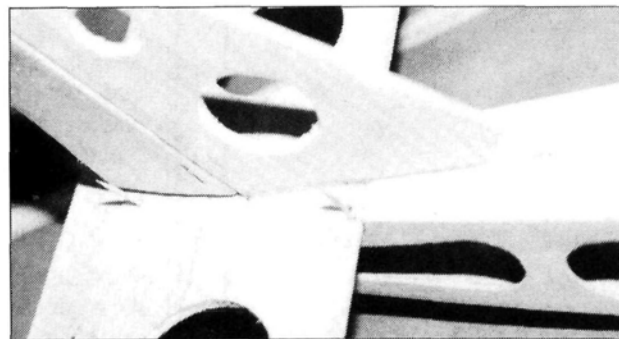
Here are the wings right out of the box. Notice the slot in the wing root and how neatly the dihedral brace fits.



The aileron has been shortened by  $2\frac{1}{2}$  inches, and the small piece of aileron stock that was cut off has been added to the wings. The toothpicks holding the hinges have been cut and sanded flush with the surface of the wing and trailing edge.



Here, the wing halves have been joined; the cloth center strip has been glued to the wing skins; the top balsa brace has been secured; and the ailerons have been hinged to the wing panels. Notice that the toothpicks haven't been cut or sanded yet



The tail surfaces are straight and strong. The large holes in them reduce the tail's weight.



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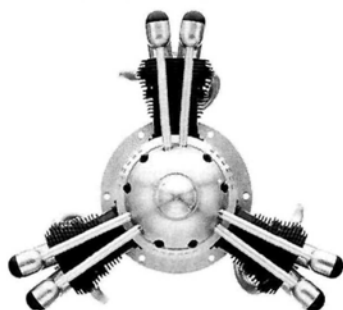
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# ALTECH SAGE 25 TRAINER

inches off the ailerons' outboard ends and glue these pieces directly onto the wing's trailing edges (see photos).

## ENGINE AND RADIO

The Enya\* .25 BBS engine was a snap to install. We only had to drill four mounting holes in the existing hardwood rails. The firewall came installed, and it already had holes drilled in it to accept the throttle cable, the nose-wheel mounting assembly and the fuel-tank lines.

A 6-ounce fuel tank fit neatly into the space provided, and the formed hatch

cover fit snugly onto the fuselage. At this point, to secure the hatch with small wood screws, we had to drill two holes in its two rear corners and into the hardwood crosspiece.

Sometimes, manufacturers make radio installation difficult for modelers, but Altech didn't do this. The kit-supplied plywood servo tray made installing the radio easy. The pushrods and clevises and the abundance of photographs and instructions enabled my nine-year-old to install the radio properly the first time! Instead of using CA to secure the servo tray to the existing rails and fuselage sides, we chose Innovative Model Products' PFM. It's a very strong adhesive, and it also helps to damp vibration.

This plane's design allowed us to install everything neatly, and there was plenty of room. We put the foam-wrapped 500mA battery under the fuel tank. We put the radio receiver (which was also wrapped in foam) behind the fuel tank, and we secured the servo tray under the wing's trailing edge.

## COVERING & FLYING

We didn't have to do much to prepare the model for covering. We just lightly scuffed it with sandpaper, vacuumed it and wiped it clean. We used Super MonoKote\* covering and stick-on letters and numbers, which don't have to

be heated.

The mains' wide stance makes the model very stable on the ground. The takeoff roll requires very little control input to keep it tracking straight. You just pull back gently on the elevator stick, and the plane is airborne. As expected, the only trim adjustment we had to make was a little down-elevator. This is typical of most models that use a Clark-Y (flat-bottom) airfoil.

The Enya .25 provides more than enough power; in fact, we rarely had to apply more than half power at any time other than takeoff. The model has excellent self-correcting tendencies; simply release the sticks, and it corrects itself. It's very stable and forgiving. The Sage 25 has ailerons, but they're

not really necessary. The rudder is very effective, and it does an excellent job of lifting the down wing at low speeds. As expected,

the Sage 25 doesn't fly very well inverted, and its aileron rolls look more like barrel rolls. Again, these tendencies can be attributed to the Clark-Y airfoil.

Our overall impression of this kit was extremely favorable. In less than 5 hours of building and covering, the plane was in the air, and we were enjoying its excellent flight characteristics. The Sage 25 is a great trainer, and it's also an excellent sport/fun-fly aircraft.

Although the plane is made of plywood, it's very light. Most planes of this size (it has a 56-inch wingspan) need a .40 engine, but this one was almost overpowered by the Enya .25. Its small fuselage cross section and its high (6.2:1) wing aspect ratio help to reduce drag.

We highly recommend the Altech Sage 25 to those who want to be in the air quickly with a durable trainer that has excellent flight characteristics.

*Editor's note: Altech will provide a parts list on request, and future kits will include them.*

*\*Here are the addresses of the companies mentioned in this article:*

**Altech Marketing**, P.O. Box 391, Edison, NJ 08818.

**Innovative Model Products**, P.O. Box 4365, Margate, FL 33063.

**Enya Model Engines**; distributed by Altech Marketing.

**MonoKote**; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824. ■

## AIRWAVES

(Continued from page 98)

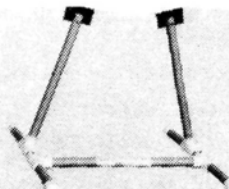
why not write to them at P.O. Box 2498, La Mesa, CA 92044; tel: (619) 448-1818. As for a trainer, there are many good ones (see our Field & Bench Review of Altech Marketing's Sage 25 this issue). One of the best sources of information on trainers is a periodically updated guide to R/C trainers published by Jim Waterman. You can contact Jim at 3818 Deerfield Dr., San Antonio, TX 78218.

To the best of my knowledge, the first solar-powered R/C aircraft was designed by AstroFlight, Inc. It had a 32-foot wingspan and made the world's first solar flight on November 4, 1974. The solar cells provided 450 watts of power to the 26-pound airplane. A 1975 version had 4,000 solar cells covering 40 square feet and delivering more than 600 watts to an Astro 40 cobalt motor. A 5:1 reduction ratio was used to turn a 33x16 prop at about 2,000 rpm at sea level and a projected rpm of about 5,000 at high altitudes.

On the commercial side, we know of one product that uses solar cells. It's the Graupner Solar Uhu (shown in last month's "Air Scoop" column). Under

(Continued on page 102)

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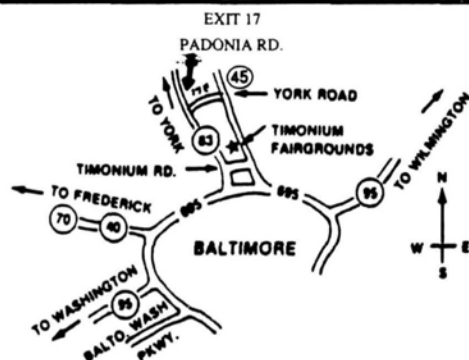
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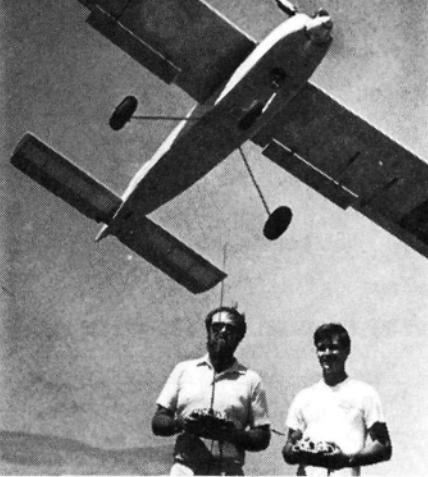
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## AIRWAVES

(Continued from page 101)

*sunny conditions, the solar cells provide about a 1-amp continuous charge, so if you "thermal" for an hour, you can just about fully recharge your flight pack. Graupner products are imported by Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027; tel: (615) 373-1444, who can give you information on the future availability of this product here.*

TA

## FUTURE AUSTRALIAN ACE

I'm a 13-year-old beginner. At the moment, I live in Indonesia, but I go to boarding school in Australia. In December '90, I bought a Pilot QB 25S (I think—whichever is the trainer model!), a JR Propo MAX-4 radio and an O.S. 28. I built the plane quickly, with lots of help from my uncle (he helped with things not included in the instruction manual). It's a great flier, but *fast*. I've logged 22 flights so far, and have accomplished my first loop, takeoff and prang (not too much damage!). I've been reading *MAN* for

about a year and love it! I'm interested in your Fantrainer. What size of servos would it take using four channels?

Our club here is the Jaya Aeromodeling Club, and we have a runway that's about 100 feet by 80 feet, plus a pit and taxi strip. Most members are sport fliers with a couple of patterns, scales and helis. Oh yes, I earned my money for my modeling gear in a professional opera!—\$420 Australian! I now need a more reliable income, however!

ROBIN TAUDEVIN  
Jakarta, Indonesia

*Robin, well it certainly sounds like you're off to a great start in this exciting sport of R/C. It's also refreshing to hear that you've earned the money need to buy your own equipment. You sound like a very mature 13-year-old. Keep up the good work.*

*The 1/2A Fantrainer that appeared in the January '90 issue of MAN is a very popular design and will be a good choice for you when you've had a little more experience with trainers. Originally, it was flown with three channels: ailerons, elevator and rudder. The engine is typi-*

(Continued on page 106)

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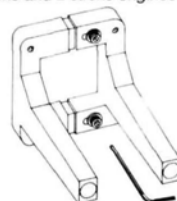
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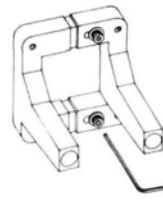
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# GOLDEN AGE

## OF RADIO CONTROL

by HAL DEBOLT

### Early electronics and the Cameron Co.

**H**ELP! I suspect that some of you have information that we'd all like to hear. Won't you consider sharing it? I'm researching two major R/C manufacturers that greatly influenced early R/C—E-K Electronics (a Texas-based company led by Bob Elliott) and Pro-Line (a Phoenix-based company that blossomed during the '70s and was later taken over by Ace R/C)—and I'd really appreciate your help.

During the '60s and '70s, many transmitter impounds were loaded with E-K's "red boxes," which filled a definite need for relatively low-cost systems. Much of E-K's equipment was very innovative. This company was about the first to offer what, today, we consider to be "sub-miniature" flight systems, but that was only a small part of what it did for R/C.

Pro-Line's Jim Fosgate fostered the distinctive "white boxes," and he later sold out to a major electronics manufacturer that produced them for a few more years. To say that Pro-Line dominated the contest

scene during the '70s would be a great understatement. If you were a topnotch pattern competitor, you were simply "out of uniform" if you didn't hold a Pro-Line! Pro-Line's greatest claim to fame was the high quality of its products, and it was probably the only company

### SMALL COMPANY—BIG CONTRIBUTION!

**M**any small operations helped a lot with the growth of R/C. Although they didn't become major corporations, their timely offerings filled definite needs and smoothed the way for us and for R/C. Well-

Cameron advertised its engines as being very competitive as far as power was concerned, but brands like K&B and Fox were more powerful. This was the Cameron engines' only shortcoming, however. Their price certainly wasn't a drawback—nearly half those of other brands! How would you like a .19 R/C engine for \$11.95 now?

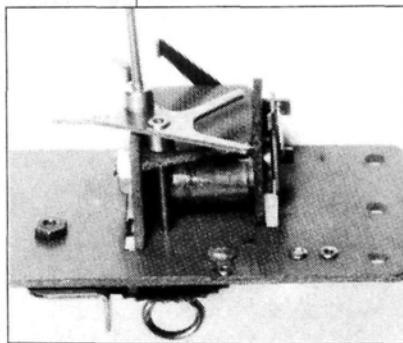
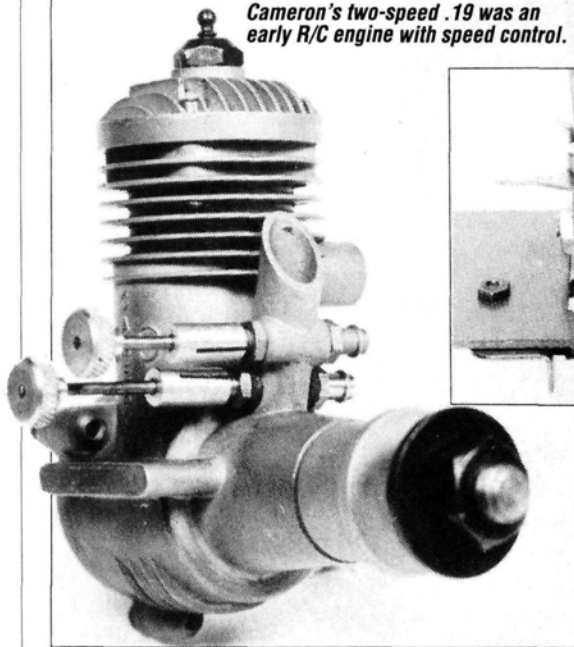
Advertised as a two-speed engine, Cameron's .19 system consisted of two needle valves—one high speed and one low—which were connected to an escapement-operated "bi-valve,"

which in turn was connected to the fuel tank. To set-up the engine for operation, you set the bi-valve in the low-speed, needle-cut-off position. Then you adjusted the high-speed needle for maximum rpm. Finally, you switched the bi-valve to shut off the high-speed needle, and adjusted the low-speed needle to run as "rich" as possible and, therefore, at substantially lower rpm.

Although this system offered a choice of power settings, it had a few shortcomings. First, it was very easy to set the low-speed valve too "rich," which

*(Continued on page 104)*

*Cameron's two-speed .19 was an early R/C engine with speed control.*



*Cameron's compound escapement was powerful, precise and rugged. It gave four positions in sequence.*

that used "military spec" components throughout its systems. Naturally, you can't buy a Cadillac at Chevy prices, so Pro-Line equipment didn't come cheap!

How can you help? I'd love to receive catalogues, instruction manuals, photos of any sort that include equipment, magazine ads and articles. Most of all, I'd like to hear about your experiences with particular brands. I'm hoping to find a "windfall" out there!

known in the '50s, Cameron Precision Engineering of Chino, CA, is a good example of such an enterprise.

Cameron was among the first to enter the R/C hobby industry with a few small engines during the heyday of C/L. Its very usable .19 was the most well-known (it would probably be labeled a "sport type" today), but all its engines were well-made and durable. Because they were reliable and easy to start, they suited beginners or average fliers.



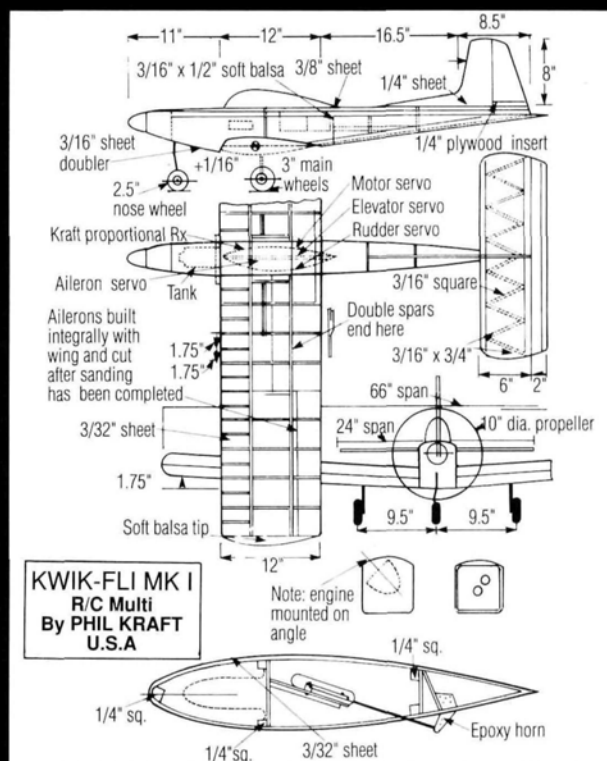
# TRY A KWIK-FLI

**T**HE EXCELLENT FLYING abilities of some of the vintage R/C designs seen at the '90 Selinsgrove re-enactment has inspired many to consider them as R/C projects. Imagine: you get an easy-flying, unusual, sport-aerobatic type *and* an authentic vintage OTer—two birds with one stone?! To be of help, I've included some outstanding examples.

In the early '60s, Phil Kraft was not only America's leading R/C manufacturer, but he was also at the top of R/C pattern competition. A very dedicated, proficient competitor, he climbed the contest ladder to reach National Champion status and eventually capture the World Championship.

Like most modelers of the time, he had plugged along with various plane designs before realizing that he could fulfill his needs better with one of his own. He created a series of planes, which he labeled "Kwik-Flis." Even though they were simple in design, Phil's planes always stood out on the flight line with their solid orange fuselages spiced with a bit of blue trim.

As the series progressed, there were very few design changes beyond altered tail shapes, etc. Obviously, there were improvements, but basically, if you saw one of Phil's planes, you saw them all! Nevertheless, they influenced pattern designs for years, and features of their design can even be seen in some of today's popular fliers.



Phil Kraft's Kwik-Fli Mk I was the first in his winning series. Its simple layout, structure and modern style make it an excellent choice for vintage-era R/C.

Obviously, the Astro Hog led to the widespread acceptance of low wings, and other planes had proven that a trike gear was mandatory for easy taxiing. Kraft's use of a big, thick, symmetrical airfoil ensured complete maneuverability and good low-speed traits, and a powerful .60 was his design's hallmark. With spans in the 60-inch range, Kwik-Flis weren't large, and they were relatively light even when equipped with reed systems. Naturally, the later versions used Kraft's proportional system, and

it was with an Mk III equipped with a propo radio that Phil won the 1967 World Champs. As the three-view indicates, the structure of these planes was simple and very similar to those we see today. Scratch-building a Kwik-Fli shouldn't be too great a challenge, and plans are available from several sources. I know you'd enjoy flying one!



PHOTO COURTESY OF ACADEMY OF MODEL AERONAUTICS

Phil came out on top at the 65 Nationals. Winners, left to right: Wierick, Kraft and Nelson.



*Curtiss Brownlee attempted to fly this craft 300 miles non-stop, but a storm terminated the flight short of that goal.*

caused the engine to “flood out” in flight—naturally, just when you needed it most! Second, a reliable low speed was never as low as you would have liked. What made the system usable was that most early designs used just enough power for flight, so *any* reduction in rpm resulted in a descent—nothing like the positive engine control we have today!

### BUT WAIT: THERE'S MORE

**C**ameron also offered a complete line of escapement actuators for R/C, which had two advantages. All of them were much more rugged than normal, which meant you could use more rubber to drive them and more power was available to operate the controls. They also included a “speed governor” that controlled the rotating speed, and this kept the required sequencing speed within usable limits.

The flagship of the Cameron line was a self-neutralizing, four-position compound escapement. There was also a typical two-position single control style as well as a bi-valve type to suit desired engine speed control. All three escapements could be operated by a single-channel radio, creating what was labelled a

“Mickey Mouse” system.

In effect, the compound drove the rudder directly—one pulse for right and two for left. If a third pulse was sent and held, the compound operated a second escapement, e.g., elevator. Four pulses operated the bi-valve escapement and changed the engine speed. This system was similar to the more popular Bonner, except that the Bonner compound had three positions while the Cameron had a fourth, which allowed a third control to be used.

The reason for the Mickey Mouse label should be obvious. Considerable practice and dexterity was required to ensure that you got the control you desired as you sequenced the necessary pulses! This was a major reason why early R/C aircraft were designed for low-speed flight: if your sequencing wasn't correct, you needed time to prevent disaster! The tendency of early radios to glitch occasionally didn't help matters!

I don't know what became of Cameron, but my guess is that its engine efforts were simply outgunned by the big boys, and with the coming of multi-channel reeds, etc., the desire for Mickey Mouse stuff fell by the wayside. Perhaps,

like the good general, the company just faded away.

### LOOSE ENDS

**F**inally, I have time to share some of the letters I've received. First, Joe Bishop of the Mid-Arkansas R/C Society (MARCS) acknowledged our efforts with an associate membership. We're sure proud to become part of such an esteemed group!

Joe tells us that, at age 9, he soloed in R/C with his dad's L.W. Jenny; after that came an L.W. P-Shooter. With their silk and dope covering, both planes are still in excellent condition! That boy must have been an OK pilot! Joe is a second-generation MARCS officer; his dad served as president during the early '70s.

Curtiss Brownlee of Oklahoma City should be a familiar name to some OTers. Curtiss told me about one of his early R/C exploits: he added polyhedral panels to the wing of an L.W. Champ to increase the span to 6 feet. After loading the modified plane with 35 ounces of fuel, he set an early R/C distance record of 88 miles! The power source

was an Anderson diesel—an English .15 engine!

Encouraged by this success, Curtiss built another special design and attempted to extend the record to 300 miles. Powered by a Fox .60, the model flew well until it encountered a storm and was destroyed. Nature has no regard for man or beast, or even precious models!

There used to be two R/C pylon-racing classes—Formula I and Formula II. While FI is still popular, FII just dropped by the wayside. Formula II was originally conceived as an alternative to FI. To encourage American fliers to become competitive with the FAI countries, the FII plane specs matched those of what was then FAI pylon. Formula I allowed a much smaller model and was popular in the USA. (Of course, in recent years, the FAI specs have been changed so that FI planes are now eligible.) Because Formula II planes were larger, slower and easier to land, it was also hoped that the event would attract newcomers to pylon racing.

Curtiss Brownlee included a photograph of his Formula II racer, and it should give you an idea of their size. The lad in the photo is his son, Mitch, who is now 33 years old! Formula II planes could be patterned after *any* full-scale racer (as FAI models can be now), so there was a greater variety of designs.

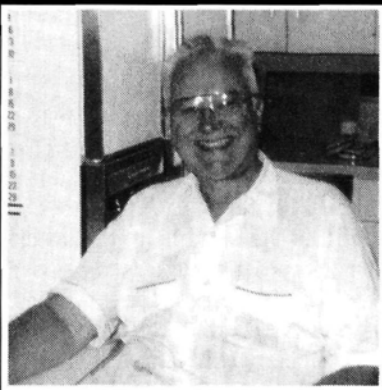
Remember: this is *your* OT R/C column, and I want to hear about your experiences, desires and ideas. Welcome aboard.



*Curtiss Brownlee's Formula II Pylon racer had a 700-square-inch wing area and required a .19 engine. Formula II models could be patterned after any air racer.*



## IN MEMORIAM DUKE FOX: 1919-1991



With the death of Duke Fox—pioneer engine designer and manufacturer—who succumbed to a stroke on February 15, the industry has suffered a great loss. Duke's contributions began with the original Fox 35 engine, which was the entry-level engine in the late '40s and early '50s and is still winning contests more than half a century later.

Duke's company, Fox Manufacturing, has served our hobby for more than 40 years, and Duke promoted "Made in America" long before it became fashionable. He built his first factory in California in the '30s, but he eventually moved to Fort Smith, AR, and he sold several hundred thousand Fox engines of many kinds—both for

development of an engine that could power a bicycle.

But Duke was more than an innovator; he was always willing to help any modeler at any time, and he assisted many at countless fly-ins and meets. For his contributions to our hobby, in 1978, Duke was inducted into the Model Aviation Hall of Fame.

On behalf of modelers everywhere, we at *Model Airplane News* extend heartfelt condolences to Betty Fox and to the Fox team.

C/L and R/C.

Perhaps the most famous Duke Fox product is the Fox Glow Plug. Known for its reliability, millions have been sold, and it remains an industry standard. Duke's prolific imagination is shown by his development of an engine that could

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15	1/24 SZ	Cur J404 "Jenny"	21*\$18	32*\$24	65*\$38	80*\$55	
16	1/24 SZ	Standard J-1 Tr	22*\$22	32*\$30	65*\$45	80*\$55	
29	1/24 SZ	Waco Taper-Wing	15*\$14	22*\$20	45*\$34	60*\$48	90*\$62
36	1/24 SZ	Westland Lysander	25*\$18	37*\$24	75*\$38	100*\$52	
35	1/24 SZ	Doug U-46-A Observer	23*\$24	34*\$32	68*\$46	90*\$56	
29	1/24 SZ	Boeing 100 Sport	19*\$16	28*\$24	45*\$36	60*\$48	90*\$62
33	1/24 SZ	Stin A Trimmer	30*\$30	45*\$38	90*\$62	120*\$75	
39	1/24 SZ	Lock Lightning P38	27*\$19	39*\$26	78*\$45	112*\$56	
29	1/24 SZ	Cur P-36A Fighter	18*\$15	28*\$20	56*\$33	72*\$56	
35	1/24 SZ	Vgt Cors O2U-1/4	18*\$20	27*\$28	54*\$44	72*\$56	108*\$68
38	1/24 SZ	Con Catina FBV5a	52*\$48	78*\$60	104*\$72	132*\$84	
19	1/24 SZ	Curtiss NC-4	32*\$66	48*\$89	96*\$138	128*\$168	
17	1/24 SZ	Fokker D-7 Ftr	14*\$12	21*\$16	42*\$30	56*\$44	84*\$56
31	1/24 SZ	Bayless Gee-Bee	11*\$12	17*\$14	35*\$32	47*\$44	70*\$56
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36	1/24 SZ	Grum "Gulfhawk"	14*\$14	21*\$18	43*\$38	57*\$48	84*\$58
43	1/24 SZ	Lock Electra #11	27*\$25	41*\$32	82*\$52	108*\$68	
43	1/24 SZ	Grum Avenger TB	30*\$28	40*\$38	80*\$52	108*\$68	
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38	1/24 SZ	NA Mitchell B-25	36*\$37	55*\$52	110*\$72	144*\$84	
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28	1/24 SZ	Sik Amphib S-38	36*\$36	54*\$72	108*\$108	144*\$144	
16	1/24 SZ	H-Pge O-400 Bomb	50*\$45	75*\$67	150*\$105	200*\$140	
31	1/24 SZ	Lindy's L-Sirius	21*\$16	31*\$22	63*\$36	84*\$48	126*\$62
31	1/24 SZ	Howard Rac-Pete	10*\$12	15*\$15	30*\$30	41*\$36	60*\$42
31	1/24 SZ	C Sparhawk F9C-2	12*\$15	19*\$22	38*\$35	50*\$48	76*\$58
33	1/24 SZ	Aerona C-3 Spt	18*\$10	27*\$16	53*\$26	71*\$36	107*\$48
38	1/24 SZ	Turners Pesco 5P	12*\$16	18*\$20	37*\$36	49*\$48	74*\$56
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## AIRWAVES

(Continued from page 102)

cally run at full throttle, as is the case with most 1/2A models. If you go with four channels, the best servo size would be the Futaba S-133 or its equivalent. The entire radio system should be on the smallish side. I'd use a miniature Cannon system, but, to avoid the cost of a miniature radio, you could fly it with two channels: aileron and elevator. This way, you could use standard servos with a 250mAh battery pack. Keep us informed of your progress, Robin.

GY

## 7TH FALL FESTIVAL

(Continued from page 83)

nel Futaba radio with seven servos. This big bird is covered with Coverite and finished with dope.

Paul Lupia's pretty Yellow Aircraft F-16C is beautifully finished in camouflage livery. It's powered by a Rossi .90 ducted-fan engine and flown with a JR R/C system. Paul had some serious engine problems that forced him to abort his flight, so he's switching to the new K&B 82

## 7TH FALL FESTIVAL

ducted-fan engine.

• Ed Izzo had a ball flying his Bizz Bee—a new kit by Bridi Aircraft Designs, Inc. He designed a unique smoke system for it that allows him to have a single smoke trail from the center of the plane, two smoke trails from the wing tips, or all three. This plane really looked neat in the air.

• Frank Buzduhanov had an immaculately finished Piper Pawnee that he designed and scratch-built. The three-year-old plane weighs 21 pounds, has an 84-inch wingspan and is powered with a Zenoah G-62 engine. It's equipped with a smoke generator, and Frank uses a Futaba PCM radio to fly it.

• Bob Violett and Dave Ribbe did some impressive flying with Bob Violett Model's new F-16C Jet models. Bob's F-16C is done up in light and dark gray, and Dave's is finished in a desert camouflage scheme. Both models are exact scale. If you want to see a work of art, check out the landing gear on Bob's F-16C; it's an exact replica of that of full-size airplane.

• Bob Benton flew a very interesting "Agility" delta electric. This highly modified "Holy Smoke" delta kit was designed by Hal Parenti and kitted by Top Flite Models. It has a 47-inch wingspan, weighs 79 ounces, and uses an AstroFlight Cobalt .40 direct-drive motor with 20 Sanyo 900mA SCR cells and a Jomar SC-4 speed controller. This airplane is very fast and a lot of fun to fly. Bob brought two other electrics to the fly-in—an Anxiety II with a 58-inch wingspan and a clipped-wing Anxiety III electric.

• Eric Dern's giant-size "Candy Man" was the finale. Eric flies his candy-loaded R/C model up to about 600 or 700 feet, circles the runway a few times and then drops the load. Then several hundred children run wildly onto the field to gather up as many goodies as they can!

It takes a great deal of work, money and people to put on a fly-in of this magnitude, and I want to thank the R/C World Fliers and their wives for a job well done.

*These hobby shops, hobby dealers and R/C manufacturers donated several thousand dollars in prizes: Hobby Box, Inc., Firenze Hobby Center, Inc., Bob's Hobby Center, Airtronics, Inc., Futaba Corp., Hobby Dynamics, Nick Zirotti Plans, Ace R/C Products, Balsa USA, Sig Mfg., Roy Vaillancourt of Vailly Aviation, World Engines, Carl Goldberg Models, Inc., Top Flite Models, Inc., Tower Hobbies, Lanier R/C Products, Wally Zober Plans, Bob Parkinson Models, Yellow Aircraft & Hobby Supplies Ltd., Ernst Products, S&R Batteries, J.P.L. Products, Florida Rep & Distributor: Bob Parkinson Flying Models.* ■

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## HELI CHALLENGE

(Continued from page 92)

isn't a problem if you remain calm. The best way to exit a tail slide is to push forward on the pitch cyclic (provided that you're looking at the top of the helicopter) while you open the throttle enough so that the heli moves forward again.

You might want to practice exiting the tail slide. Simply pull the helicopter up to vertical from forward flight, and allow the air speed to deteriorate to the point where the helicopter slides backward on its tail. Push its nose forward, and open the throttle to recover.

The stall turn can be combined with other basic maneuvers to create complex aerobatics. Model helicopters have very limited vertical ability when their noses are pointing straight up. For some extra vertical climb, open the throttle completely while you hold forward cyclic pitch to keep the nose on the "up-line". The results of this practice can be unpredictable as the effects of gravity overcome the force of kinetic energy and aerodynamic lift. If you experiment with this technique, be prepared to fly out of some unusual attitudes. As I mentioned

earlier, it's usually best to get the heli's nose headed downward and to gently recover to level flight. Just stay cool through the hairy parts, and practice with plenty of altitude. ■

## KYOSHO EP CONCEPT

(Continued from page 89)

of position. This sensation, which is characteristic of small electric helicopters, is caused neither by deficiencies in head design nor by the small rotor disk. What happens is that the mass of the battery pack at first resists the cyclic command and then later swings like a pendulum underneath the rotor head. The pendant battery initially damps the cyclic, then, as the machine approaches a new steady state with the disk tilted, the "damped" feel goes away.

Electric helicopters require some experimentation when you set them up for forward flight; the EP Concept is very stable in fast forward flight. Spend a few

(Continued on page 110)



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## KYOSHO EP CONCEPT

(Continued from page 109)

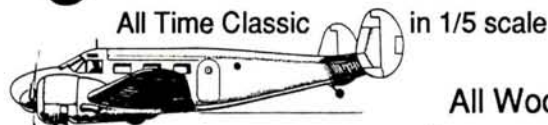
flights observing how the helicopter behaves when you make the transition from forward flight to hovering and when you make slight nose-up or nose-down corrections while trying to maintain level forward flight. By trial and error, you'll find one battery position (fore/aft) that minimizes "ballooning" or pitching-up when you apply aft cyclic. The EP's bracket and clamp design makes this easy. I use additional rubber bands to prevent the battery from shifting. To make this battery positioning repeatable, you can note the "droop" angle at the nose, or mark the pack where it fits against one of the landing-gear struts.

It's tempting to make performance comparisons of electric R/C helis based on flight duration or air time per charge. I don't advocate this because of the very many variables in power systems (motor efficiency, horsepower and torque, battery-energy density and discharge characteristics) and in flying conditions (indoors or outdoors; hovering in ground effect or using translational lift in forward flight). My EP hovers have lasted around 4 minutes with the loss of climbing power occurring at the 3 1/2-minute mark. Everyone I know who gets past the electric heli novelty stage starts tinkering with weight reduction and battery packs, and many pilots have already tried replacing the stock motors. A pilot in northern Illinois has flown for 5 1/2 minutes using a 1700mAh pack.

I've only attempted wing-overs and stall turns with the EP, but during one of his recent visits to Southern California, Dick Grossman saw stock EPs doing loops and modified EPs (incorporating the aforementioned after-market motors

(Continued on page 122)

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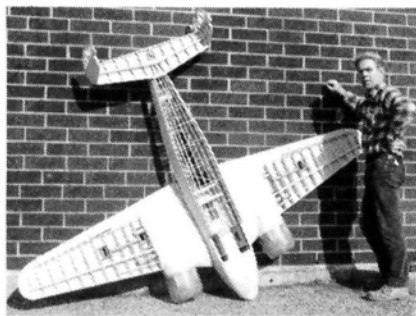
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Price: \$40 (plan set), postage paid in the U.S.

For more information, contact Nick Zirolis, 29 Edgar Dr., Smithtown, NY 11787.



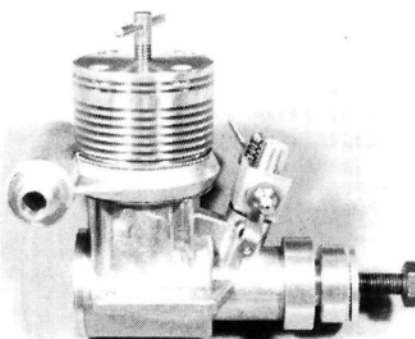
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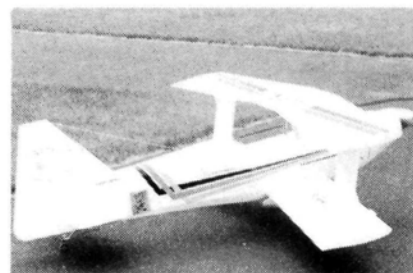
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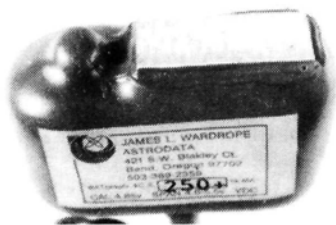
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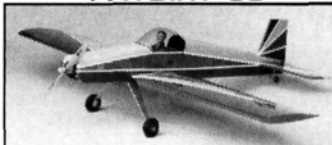
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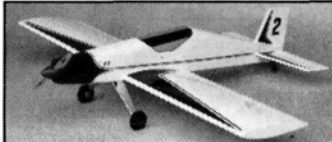
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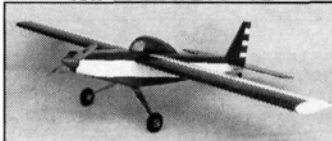
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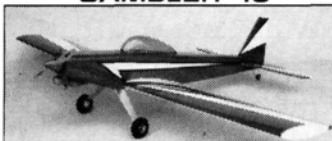
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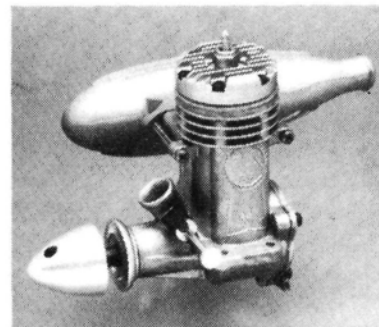


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## IN MEMORIAM

### BOB PECK: 1935 - 1991

**T**he modeling fraternity is saddened by the loss of another industry giant—Bob Peck of Peck Polymers, who passed away



puller shaft to close tolerances for accurate down-thrust adjustments. This highly successful bearing became a worldwide stan-

dard. In 1972, Bob turned his modeling pursuits into a part-time business, which his wife ran, while Bob pursued his engineering work and designed kits.

In 1972, Bob

on January 7 following a heart attack in late December. He leaves his wife, Sandy, and two daughters, Jill and Vera.

As a youngster, Bob was an avid modeler, and in the late '60s, his interest in peanut-scale models led him to design plastic thrust bearings that held the pro-

suffered a nearly fatal automobile accident, and he spent the next two years making repeated visits to the hospital. Eventually, although confined to a wheelchair, he returned to work part time. In 1974, Sandy and Bob made Peck Polymers a full-time business, and the company was

soon famous for its free-flight rubber-powered planes, and later, for small R/C airplanes and blimps.

In 1986, a company fire almost completely destroyed 15 years of hard work, but with the help of their many friends and with Bob's typical strength in the face of adversity, the Pecks fought to rebuild their business. In two years, they were back in full production.

In 1989, in recognition of their significant contributions to aeromodeling, Bob and Sandy Peck were inducted into the Free Flight Hall of Fame. Sandy continues to run the business. On behalf of modelers everywhere, we at *Model Airplane News* extend our condolences to the Peck family.

# CLUB OF THE MONTH

## STARS\*DUST

**SOUTHERN TIER AERO  
RADIO SOCIETY, INC.**

c/o George Privateer, Fortune Dr.,  
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**H**ow many modelers have been involved with their club for 10 years? At its last winter party, the Southern Tier Aero Radio Society (STARS) gave brass and oak plaques to 17 of its members for reaching this milestone. Even more amazing is that some members have belonged to the club for 50, or even 60, years! The club has been around for 61 years, and it has a great history and tradition. Considering how much work it takes to keep an active club going, this speaks well of the membership.

The STARS winter party was a great success. Approximately 50 people partook of the merrymaking, and members worked hard to make sure the shindig went off without a hitch.

Unfortunately, it seems some rain always has to fall on the parade. With the STARS, this "rain" takes the form of local politics, which interfered with the club's efforts to use the Olean Municipal Airport for its annual summer rally. In past years, the club was welcome to use the airport without charge because it benefitted the city. Even the mayor is in favor of the club's using the facility free, but despite the gallant efforts of the club's officers, the Common Council—spearheaded by an unyielding group—voted against it. What a shame that they can't see the positive attributes that R/C clubs have to offer. This is just another example of a club unfairly losing the use of a flying site.

At least, member Dick Say interspersed this bad news with the good in the club's newsletter, "Stars Dust." This is a high-quality publication—more hard work! It doesn't include the "snore and bore" associated with some club newsletters; instead, it tells of the raffle prize winners, members' projects, and it even has an "Identify the Mystery Plane" contest that boosts member participation. If you win, you get a free 50/50 raffle ticket. It isn't a big prize, but it's a nice gesture. Bravo, STARS!

For the hard work of its dedicated members, we're sending STARS two free subscriptions. Congratulation on being our "Club of the Month," and good luck with your next 61 years! ■



# HOBBY SHOP DIRECTORY

**Retailers:** Make your business grow with new traffic! Now you can advertise your hobby shop in the **Model Airplane News Hobby Shop Directory**. The listing will be published monthly and will be listed according to city and state. You will have 3 to 4 lines, approximately 20 words, in which to deliver your sales message, plus space for your store's name, address, and telephone number.

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## ADVERTISER INDEX

Ace R/C	110
Aeroglass R/C Flight Academy	59
Aerotrend	66
Airtronics, Inc.	4
Altech Marketing	C2,35
America's Hobby Center	62
AMP Inc. Graphics	109
Applied Design Corp.	73
AstroData	73
Badger Air-Brush	59
Basics of R/C Airplanes	68
Basics of R/C Helicopters	96
Basics of R/C Sailplanes	48
Bob Holman Plans	111
Bob Violett Models	9
Bolar Heli Research	102
Byron Originals, Inc.	3,95
Carden Corporation	118
Chris Murphy Flight Jackets	109
Classified Directory	111
Cleveland Model and Supply Co.	106
Coverite	66
Cox Hobbies	15
D.C. Model Aircraft	102
Dickybird Models	64
Doylejet	116
Du-Bro Products	55
Ernst Mfg.	102
Fiberglass Master	116
Fox Manufacturing	106
Fun Scale	66
Futaba Industries	C3
Future Flight	98
G and P Sales	67
G. Bertella	77
G.M. Precision Products, Inc.	119
Great Planes Models	18
Heritage Collectors' Gallery	67
Historic Aviation	7
Hobbico	28
Hobby Lobby International	108,109
Hobby Shop Directory	119
Image Products	98
Innovative Designs	107
Innovative Modeling Products	122
John Sullivan	101
J'Tec	116
K&B Manufacturing, Inc.	107
K&S Engineering	107
Kress Jets, Inc.	79
Kyosho	90
Kyosho/M.A.N. Heli Challenge	38
Landing Products	10
M.A.N. Aero Picnic	65
M.A.N. Back Issues	120-121
M.A.N. Books	26-27
M.A.N. Design Contest	11
M.A.N. Plans	112-113
M.A.N. Prints	80
M.A.N. T-Shirts	98
M.A.N. Trainer Pak	79
Mail Order Form	117
MARC Show	101
Midwest Products, Inc.	77
Miniature Aircraft USA	84
Model Aviation Products	101
Model Products Corp.	67
Nick Ziroli	110
NRI Schools	41
Officers & Gentlemen	122
OnBoard Systems	73
O.S. Engines	C4
Pacer Technologies	45
Paradise Flight School	102
Radar Sales	106
R/C Airplane Buyers' Guide	47
RCD	70
R/C Products	64
Retailer	23
Robart Manufacturing	119
Seacoast Aerowagon	82
Sig Manufacturing	30
Slimline Manufacturing	77
Smithy	98
SR Batteries	8
Stream, Inc.	82
Swanson Associates	109
Tatone, Inc.	73
Technopower II, Inc.	100
Telelite Corporation	118
Tower Hobbies	13,93
Vailly Aviation	122
Watkins Aviation, Inc.	107
Williams Brothers, Inc.	66
Windsor Propeller	43
Wing Manufacturing	106
Young Engineering	116

## KYOSHO EP CONCEPT

(Continued from page 110)

and batteries) doing rolls and multiple loops.

Great Planes Concept project leader Tim Lampe told me that Kyosho has developed accessories to improve the EP's performance. These include flybar paddles with lighter collars, a fiberglass tail boom and aluminum shafts to replace the steel main shafts and transfer shafts. Kyosho seems to be encouraging the development of bolt-on and do-it-yourself "trick" EPs.

## CONCLUSIONS

The EP Concept is well-designed and manufactured to very high standards. The high level of pre-assembly means it's easy to get it airworthy, but you must be thorough when setting up the pushrods and the speed controller, and when breaking-in the motor.

The 7-cell power system means that readily available R/C car batteries and chargers can be used to support electric hovering. The EP is exceptionally strong for its weight, and the main part of the

mechanics ought to survive hard landings even better than some .30-size ships. This "overbuilt" characteristic offers many possibilities for hot-rod modifications like weight reduction and fitting more powerful motors; there's no question the airframe will be able to take it. I wouldn't recommend that any but the most studious and patient of beginners try to learn how to hover with the EP, but this electric Kyosho promises to be a lot of fun for many pilots.

\*Here are the addresses of the companies mentioned in this article:

**Kyosho/Great Planes Model Distributors**, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61824.

**Loctite Corp.**, 4450 Cranwood Ct., Cleveland, OH 44128.

**Sermos R/C Snap Connectors**, Cedar Corners Stn., P.O. Box 16787, Stamford, CT 06905.

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